



TOWARDS A GREEN FUTURE

A Trainer's Manual on Education for Sustainable Development

Centre for Environmental Education, Ahmedabad, India

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Some of the activities in this manual such as '24 Hours' and 'Count Down' have appeared in more than one publication. They have been adapted for use in a training situation focussing on Education for Sustainable Development.

The activity 'For the Common Good' draws its inspiration from the following source:

Brouse, Deborah E., Wasserman, Pamela B. *For Earth's Sake*. Washington, D.C.: Population Education.

The articles "Abundant Scope seen for Ecotourism in Matheran", "Latur Houses Ignore Safety" and "Regenerating Forests: Tribal Women Show the Way" have been reproduced by arrangement with The Times of India and are the copyright of the publishers, Bennett, Coleman & Co. Ltd. The Times of India may be viewed at <http://www.timesofindia.com>.

We extensively referred to many publications for developing this manual. We would like to acknowledge the following for the same:

Gadgil, M., and Guha, R. 1995. *Ecology and Equity*. New Delhi: Penguin Books.

IUCN. 1997. *An Approach to Assessing Progress Toward Sustainability—Tools and Training Series*. Prepared by the IUCN/IDRC International Assessment Team and pilot country teams in Colombia, India and Zimbabwe.

UNDP. 1998. *Human Development Report-1998. Changing Today's Consumption Patterns—or Tomorrow's Human Development*, New York: Oxford University Press.

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UNDP. 1997. *Human Development Report -1997.* New York: Oxford University Press.

WRI. UNEP. UNDP, The World Bank. 1998-99. *World Resources: A Guide to the Global Environment. Environment Change and Human Health.* New York: Oxford University Press. 1998.

Some of the pieces in this Manual include extracts from earlier publications of CEE. We would like to acknowledge the following for the same:

Essential Learnings in Environmental Education: A Database for Building Activities and Programmes

Conserving Our Water Resources

EnviroScope: Biodiversity

EnviroScope: Citizen Action

India's Environment Action Programmes - Issues, Approaches and Initiatives

Environment and Development—Traditions, Concerns and Efforts in India

The views expressed in the articles in this manual are those of the authors and do not necessarily reflect the views of the Centre for Environment Education.

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Centre for Environment Education [CEE] is a national institution established in 1984 and supported by the Ministry of Environment and Forests, Government of India as a Centre of Excellence in Environmental Education. The main objective of CEE is to create environmental awareness among children, youth and the general community. To achieve this, CEE develops innovative programmes and material, and field tests them for their validity and effectiveness.

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About this Manual

Pollution, deforestation, loss of biodiversity, the ozone hole, global warming...these are just some of the environmental problems that face us today. Where did they come from?

To get to the answer, we need to understand how we interact with the environment.

All the basic resources required for living come from the environment. It is the environment that provides raw materials to industries, food for people, fuel for transport, etc. The environment also absorbs the waste that developmental activity creates. That is, the environment is both a source and a sink for developmental activity.

For example, inland water bodies are a source of fish, water for irrigation, etc., for village economies. They also act as a sink for excess fertilizer and pesticides that may run off from agricultural fields.

The way people interact with the environment influences its health and well-being.

Overusing environmental resources causes environmental degradation. Letting out waste materials into the environment beyond its capacity to degenerate them causes environmental pollution.

Many of today's environmental problems have emerged because of this overuse and/or misuse of our natural resources. For example, deforestation is a result of overexploitation of forest resources.

All of these problems have an impact on human well-being. Some of these may directly impact humans. For example, air pollution has a direct impact on human health. Others may impact humans indirectly. For example, one of the effects of global warming is predicted to be the spread of vector-borne diseases (such as malaria). This is because many disease causing insects thrive in warmer conditions.

Environmental problems may have both short term and long term impacts. For example, the short term impact of deforestation may be that local communities find it harder to find fuel wood and fodder. The long term impacts may be soil erosion, loss of a watershed, etc.

Solving existing environmental problems and preventing new ones from arising will require an understanding and appreciation of the linkages between environmental well-being and human well-being. However, many of these linkages are not apparent at the first instance.

This is where education is crucial. To bring environment and development concerns to people's notice, to enable them to understand the linkages between the two, to encourage them to take appropriate action, and to equip them with the skills necessary for taking the required action— education is necessary for all this.

This education, referred to as 'Environmental Education' is defined as a process aimed at developing a world population that is aware of and concerned about the 'total environment' and its associated problems, and which has the knowledge, attitudes, commitments and skills to work individually and collectively towards the solution of current problems and the prevention of new ones.

One of the guiding principles of Environmental Education (EE) is to consider the environment in its totality—natural and built, technological and social (economic, political, cultural-historical, moral, and aesthetic). Thus EE concerns itself not only with environmental well-being but also with human well-being

With this holistic approach, EE has the potential of contributing to progress towards a world where there is lasting environmental and human well-being. In other words, EE has a role in promoting Sustainable Development.

This role is acknowledged in *Agenda 21*, the principal outcome of the 1992 United Nations Conference on Environment and Development held at Rio de Janeiro which describes the actions necessary for progressing towards a sustainable society. Chapter 36 of *Agenda 21* states:

“Education is critical for promoting sustainable development and improving the capacity of people to address environment and development issues...It is critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision making.”



This manual is an effort to facilitate the efforts of environmental educators in contributing to progress towards Sustainable Development.

Environmental Education and Sustainable Development —Questions and Concerns

Sustainable Development is increasingly gaining acceptance as a desirable goal across the world. The role of education and awareness in facilitating action for Sustainable Development is being recognized as critical.

Environmental Education is taking on a major role in responding to this need. The NGO Forum at the Earth Summit endorsed a treaty on Environmental Education for Sustainable Societies and Global Responsibility (NGO Forum, 1992) which enumerated a number of principles to guide the future direction of EE. Some of these are:

- EE must involve a holistic approach and thus an interdisciplinary focus in the relation between human beings, nature and the universe.
- EE must stimulate solidarity, equality, and respect for human rights involving democratic strategies and an open climate of cultural interchange.
- EE should treat critical global issues, their causes and inter-relationships in a systemic approach and within their social and historical contexts. Fundamental issues in relation to development and the environment, such as population, health, peace, human rights, democracy, hunger, degradation of flora and fauna, should be perceived in this manner.

This understanding places a large gamut of concepts and issues under the purview of EE. It also presents a challenge in terms of the methodologies that need to be used.

This manual was visualized as a small step towards meeting this challenge. We encountered several questions as we started work on the manual:

Which specific concepts and issues do we need to discuss and in what depth? How do we address something of this magnitude? Where do we start? How do we make teaching and learning participatory and interesting?

An idea that helped us in getting started was this:

Look at this picture. At first it seems to be a collection of meaningless squiggles and blurbs. But after some time, you suddenly see the connections! The meaningless shapes make sense. You don't perceive them as separate blotches, but together — as a whole. The shape becomes a man riding a horse.



How did it happen? It happened because the mind made the connections between these seemingly unrelated blotches. It filled up the gaps — the white spaces in between.

This manual is very much like the picture. It contains a selection of themes which illustrate the linkages between environment and development. The themes featured in the manual do not make up a comprehensive curriculum for educating for Sustainable Development. They do not form a complete picture. They are a selection that is meant to provide a framework. The blank spaces have to be filled in by the user with his/her connections and ideas to make it a meaningful whole.

The Manual

This manual has primarily been designed for use by trainers in integrating Sustainable Development issues and concerns in their training programmes. It can be used to provide an orientation to Sustainable Development issues and concerns in a variety of training situations — teacher training, training of NGO personnel, training of environmental educators, training of youth volunteers in environmental conservation programmes, etc. It can also be used in higher secondary or under-graduate classes.

The manual discusses a variety of issues which have a bearing on Sustainable Development including Sustainable and Unsustainable Development, Population, Quality of Life, Consumption, Environmental Impact, Biodiversity, Agriculture, Human Health, Equity, People's Participation, Legal Instruments, Decision Making, etc.

The trainer may choose to do a complete module using all the activities in the manual (and by adding some on her/his own), or may select specific activities to fit into an ongoing training programme.

The Manual has three major sections:

Section I

This section introduces the concept of Sustainable Development. The units within this section help the participants to visualize and share their ideas about Sustainable and Unsustainable Development. It also introduces the concept of Indicators for Sustainable Development.

Section II

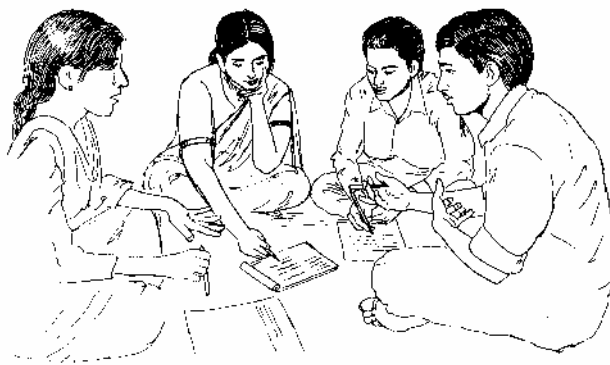
The units in this section examine specific themes related to Sustainable Development. These include Carrying Capacity, Over-population, Quality of Life, Consumption, Sustainable Use of Resources, Environmental Impact of Products, etc. The values and threats to Biodiversity also feature in this section. Human activities such as Agriculture, Tourism, Trade, etc., and related concerns are discussed. Concerns regarding human well-being such as Human Health and Equity are also included in this section.

Section III

The units in this section point to possible approaches to progress towards Sustainable Development, and the issues associated with these solutions. People's Participation, the role of Legal Instruments, the importance of Scientific Inquiry, the dynamics of Decision Making, the significance of Individual Contributions and the need for making choices, feature in this section.

Each unit in the manual is dealt with in two major components:

1. Before You Begin
2. Activity



Before You Begin

This component has two sub-components.

The first sub-component introduces the trainer to the concepts on which the activity (which follows) is based.

The sub-component 'Spotlight' illustrates some of the concepts and related issues through cases. The cases featured in Spotlight have been drawn mainly from newspaper reports, magazine stories, etc. and will help to relate the concepts to our everyday life.

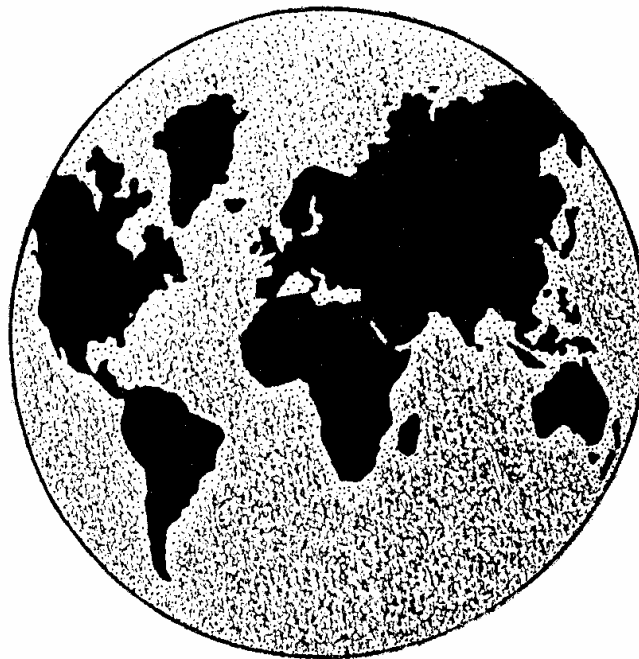
Activity

This component describes the activity and gives all the necessary details—the objective, time required, the procedure, etc.

The sub-component ‘Preparation’ tells the trainer about the materials he/she needs to prepare for organizing the activity.

The activities may not be meaningful without a follow up discussion. The participants should be encouraged to discuss issues that the activity brings up. The facilitator will have to guide the participants through the process of discussion. Each activity in the manual also has a sub-component ‘Discussion’, which gives an illustrative set of questions the trainer can use to facilitate the discussion.

SECTION I



My Vision for the World

Before We Begin

There are many views and many definitions of Sustainable Development. Here are a few definitions:

Sustainable Development is development that “meets the needs of present generations without compromising the ability of future generations to meet their own needs”. (*Our Common Future*, 1987)

A sustainable society is “one that...can be sustained indefinitely while giving optimum satisfaction to its members”. (*Blueprint for Survival*, 1972)

“For development to be sustainable it must take account of social and ecological factors, as well as economic ones; of the living and non-living resource base; and of the long term as well as the short term advantages of alternative actions”.(*World Conservation Strategy, 1980*)

The common elements that most definitions cover are the well-being of the human society, the well-being of the environment and sustainability over time.

Spotlight

Time Line

Sustainable Development and Sustainability are popular terms today. There is a history which contributed to their evolution and acceptance. Some of the major milestones in this history are:

1962: Rachel Carson publishes her book ‘Silent Spring’. It highlights how agricultural pesticides are building up to hazardous levels affecting animal species and human health. It shatters the assumption that the environment has an infinite capacity to absorb pollutants.

1968: Paul Ehrlich’s ‘The Population Bomb’ is published. It is on the connection between human population, resource exploitation and the environment. In the same year The Club of Rome established by 36 European economists and scientists, commissions a study of global proportions to model and analyze the dynamic interactions between industrial production, population, environmental damage, food consumption and natural resource usage.



1972: The United Nations Conference on Human Environment is held in Stockholm. It provides the first international recognition of environmental issues. In the same year, the Club of Rome publishes ‘Limits to Growth’. The report is extremely controversial because it predicts dire consequences if economic growth is not slowed down. The developed countries criticize it because it does not include technological solutions. The developing countries also criticize it because it advocates abandoning economic development

1987: 'Our Common Future' (also called the Bruntland Report) is published. It plays a role in popularizing the term 'Sustainable Development'.

1992: U.N. Conference on Environment and Development is held in Rio de Janeiro. Some of the major outcomes of this conference are the *Agenda 21*, the Convention on Biological Diversity, the Framework Convention on Climate Change, the Rio Declaration, and a Statement of Non-binding Forest Principles.

(Source: International Institute for Sustainable Development. <<http://iisd1iisd.ca>>. October, 1997)

Activity - My Vision for the World

Thrust Area:	Sustainable Development
Group Size:	About 20
Time:	1 hour
Materials:	Sheets of plain paper (one for each participant), Pens/pencils/felt pens, Writing board and chalk/markers

Objective

To encourage the participants to think about and share their perceptions of a Sustainable world.

Procedure

Give each participant a sheet of paper and a pen.

Ask them to put down on their sheets their vision of how they wish the world to be in the future. Stress on the fact that they need to put down how they WISH the world to be in the future and NOT how they EXPECT or FORESEE what the world will be like. Each participant must work individually.

The participants should not write their names on the sheets.

The important rule is that no words can be used on the sheet. They can draw pictures or use other symbols to convey their ideas. They are also not allowed to talk to each other during the exercise.

Tell the participants that it does not at all matter if they are not good at drawing. The task is to put down ideas on paper—it does not matter if it is not a perfect picture.

After the participants finish, collect all the drawings, and distribute them at random amongst the participants, so that each person in the group gets a picture made by somebody else.

Ask the participants to study the pictures they have received for a couple of minutes.

Ask each participant to share with the group what he/she understands from the representation on the paper.

Then ask the person who made the picture if he/she would like to comment further on the picture.

Take the main points from the descriptions given by both the participants and put them in the form of key words on the board.

Discussion

Are there any common themes which emerge from the ideas of the different participants?

There may be certain common themes that are easily identifiable in the ideas that the participants put forward. For example, many of them may have put human happiness, economic prosperity, a clean and green environment, etc. Bring to the participants' notice that their ideas include both human well-being and environmental well-being. Tell them that this is what Sustainable Development is based on. Human well-being and environmental well-being are interdependent.

(It may be possible with some groups that they focus on only one area—that is, their sketches may comprise of only human well-being and ignore environmental well-being, or vice versa.

In this case, facilitate the participants' thinking by asking questions like: Would you like to add anything else to the ideas we have here?

Do you think it is possible to have a world in which people are in a state of well-being but the environment is degraded and polluted?)



Variation

The participants can work in small groups of 4-5, to put the listed attributes (key words) in a poster format to be put up in the room as a reference for the rest of the sessions. They can also develop visual symbols for each of the attributes they list. For example, a moon for 'Peace'; weighing scales for 'Equity'; etc. The symbols can be cut out from colourful paper or from old magazines and newspapers. All the symbols can then be creatively combined to make a 'Sustainable World' collage.

What Went Wrong?

Before We Begin

Economic growth has generally been accepted as the approach to development. Richer countries are often called 'developed' countries while poorer countries are referred to as 'developing' countries.

In traditional economic thinking, the goal was always economic growth, in the belief that an increase in economic growth necessarily implied an increase in human well-being. But now we understand that economic growth is only one part of development.

Development in its true sense is more than just economic growth. In its holistic sense, development is concerned with economic growth, the quality of life of people and the health of the environment. There is a difference between quality of life and standard of living. Quality of life refers to our health and happiness. Standard of living refers to our consumption of goods and services, which may or may not make us happier or healthier.

Attempting development only by increasing economic profits and in isolation from concerns of human and environmental well-being can have undesirable consequences.

Spotlight

Paradise Squandered!

Long, long ago on a little island far, far away, a happy people lived. Their island Karu*, had everything they needed: coconut trees for food and drink, magnificent spreading *tomano* trees for shade, abundant bird life and an ocean full of fish. Two hundred years ago an English sailor discovered Karu and called it Pleasant Island.

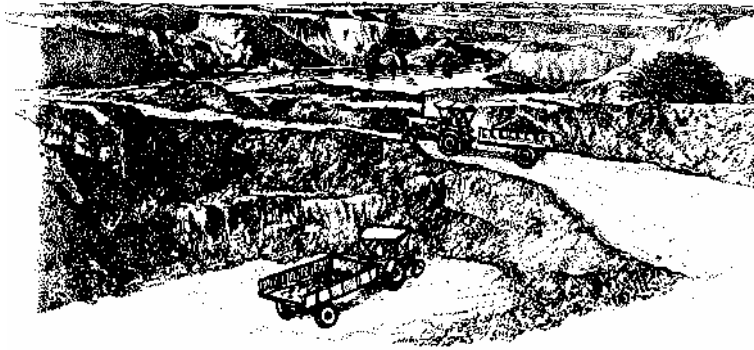
Another century passed before an expedition was carried out to Karu. It was then discovered that the island had one of the richest piles of phosphate rock on the globe. For most of this century, millions of tonnes of phosphate were shipped to other countries, where they fertilized fields and farms.

*Karu is a small island, a little over 20 square kilometers. The population includes 7000 Karuan natives and another 3000 imported workers.

Karu has only one road around the island, but the average Karuan family has at least two vehicles. They also have microwave ovens, stereo equipment and multiple televisions per family. Nine out of every ten Karuans are obese, and young men can weigh more than 135 kilos. Why? Because their native food was replaced by imported foods which are subsidized by the government. Meat brought from another country more than 3200 kilometers away is cheaper in Karu than it is in that country. Today Karuans even import fish! The changed diet habits are showing their ugly effect on Karuans. A person on the island can be expected to live only for about 55 years. Diseases like hypertension, heart disease and diabetes are common on the island.

Karuans receive their housing, power supply, water, telephones education and medical services free or for a nominal charge. The tiny island has two hospitals, and Karuans needing specialist treatment are flown at government expense to other countries.

Where does all this wealth come from? The phosphate. What then is the problem?



The phosphate could run out before the next century. The government is now desperately searching for more phosphate even as the interior of the island lies ravaged by mining. They even plan to demolish the President's residence in their search. Karuans continue to tear their island apart, live and spend as if there is no tomorrow. At this rate there may not be one.

* The name of the country has been changed.

(Based on: "Paradise Squandered". *Reader's Digest*, August 1997).

Activity - What Went Wrong?

Thrust Area	Unsustainable Development
Group Size	About 20
Time	2 hours
Materials	Four copies of the case study 'Paradise Squandered!', chart paper, old magazines, felt pens.

Objective

To enable participants to critically examine the prevalent mode of development.

Procedure

Divide the participants into groups of 4 or 5 and give each group a copy of the case study.

Ask the group to read the case study and design a presentation on Karu's development. The purpose of the presentation should be to examine if Karu's development is sustainable. Each presentation should give a background introducing Karu, outline its present course of development, say what the problems are and discuss the future options for its development.

Each group can choose its own format for making the presentation. They can choose from among the following formats:

What Went Wrong?

1. Be a news reader. Your task is to tell Karu's story on TV.

2. Make and enact a play on Karu.
3. Design a poster depicting the issues concerning Karu.
4. Make a song or a poem on Karu.
5. Write a news article on Karu and give it a catchy heading.

Discussion

What makes the case an example of unsustainable development?

Karu is an example of economic growth without sustainability. It is unsustainable because—

- the economic gains are a result of seriously depleting the natural resources of the island and may not last into the future, as the phosphate reserves get exhausted,
- human well-being is threatened because of health conditions such as obesity, hypertension, heart disease and diabetes,
- there seems to be no alternative for the future when it is obvious that soon the only source of income will disappear.

How would you have planned Karu's development, so that it is sustainable?

Depending on a single non-renewable resource—phosphate, and overexploiting it, are probably the major reasons for Karu's development being unsustainable. The Karuan government needs to explore and encourage economic activities which are ecologically, socially and economically sound. Infrastructure facilities that will contribute to these activities will have to be developed.

Karu has abundant renewable natural resources—fisheries, coconut trees, etc. Wisely harvesting these resources in a way that they are not depleted is probably one way in which Karu's development could have been planned.

Another important resource which needs to be developed and utilized to the optimum is Karu's human resource. Education and training will be required to help Karuans take up alternative economic activities, and to reduce dependence on others.

Subsidies on services and goods have possibly led to over consumption. This has led to undesirable affects on the health of people.

Are there examples closer to where we live of unsustainable practices? What are they?

Though all cases of unsustainable development may not be as stark as the case of Karu, it may be possible for the participants to identify situations in which either the human well-being or the environmental well-being, or both, are undermined.

Half a Story

Before We Begin

The basic resources required for living come from the environment. It is the environment that provides raw materials for our industries, food for us, fuel for our transport, etc. The environment also absorbs the waste that our activities create. That is, the environment is both a source and a sink for developmental activity.

For example, inland water bodies are a source of fish, water for irrigation, etc., for village economies. They also act as a sink for excess fertilizer and pesticides that may run off from agricultural fields.

This is the reason why we cannot look at development in isolation from the environment which supports it.

Attempting development only by increasing economic profits and in isolation from concerns of human and environmental well-being can have undesirable consequences. When this happens, development activities cannot be sustained.

Thus, for development that will be sustained, the challenge is to make economic growth, human well-being and environmental well-being compatible.

Spotlight

Aquaculture

Aquaculture is the farming of a wide variety of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. It can be undertaken in a wide variety of aquatic terrain such as rivers, lakes, reservoirs, ponds, estuaries and coastal waters.

Shrimp aquaculture traditionally practiced in Kerala and Bengal is done in low-lying coastal areas, which are inundated with brackish water during the monsoon. The wild shrimp and other fish seed are brought in with the high tide. Farmers impound these waters and allow the shrimp seed to grow naturally without devoting any special attention. Four to six months later, during low tide, the earthen bunds are broken, the wafer drained through a net and the shrimp harvested.

Modern shrimp aquaculture farms are entirely different. These farms are based on:

- Constructing ponds and pumping in brackish water (from the sea, canals, etc.),
- Stocking ponds with shrimp seed (harvested from the wild or produced in hatcheries),
- Feeding shrimp (with oil cake, fish waste, or industrially produced feed), and
- Harvesting shrimps when they have grown.

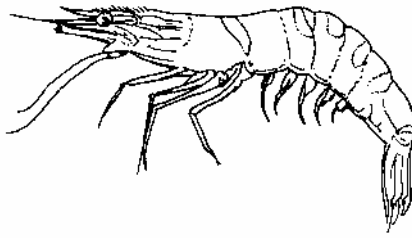
The intensity of shrimp aquaculture depends on the number of shrimp seed per hectare.

This can range from 20,000 shrimp seed per hectare to 350,000 per hectare. Increase in intensity of shrimp seed per hectare will necessitate

- Increase in the frequency of releasing pond water contaminated with leftover feed and other organic wastes into the environment,
- Increase in pumping of brackish and fresh water into the ponds,
- Increase in risk of disease which leads to an increase in the use of drugs and chemicals, and
- Increase in the number of shrimp harvested per hectare and in profits.

Modern shrimp aquaculture started in a small way in the 1980s. After 1991, many large industrial houses set up export-oriented shrimp farms. In Andhra Pradesh, the area

under shrimp aquaculture grew from about 8,000 hectares in 1991-92 to about 53,000 hectares in 1994-95. But this growth has not been without problems.



Socio-economic problems

The lands now occupied by corporate aquaculture ponds were once freely accessible to local communities who used them for fish drying, net drying, grazing, subsistence cultivation, etc. The increase in demand for land for conversion into shrimp ponds also lured many local farmers to sell their land to corporate giants. The conversion of paddy lands into shrimp ponds has resulted in loss of employment and local-level food security. Local fishermen in some places also found their access to the sea made difficult because of shrimp farms along the shore.

Environmental problems

Shrimp farming requires brackish [salty] water. Conversion of large areas of land into ponds that store brackish water has led to salinisation of nearby agricultural lands. It has been estimated that at least 9,000 hectares of paddy lands have become useless due to shrimp aquaculture in coastal Andhra Pradesh. The water in nearby wells has also been affected by salinity. Organic wastes from the shrimp pond find their way into the local surface waters each time the pond water is thrown out. In 1994-95, a viral attack wiped out most of the shrimp produce. The rapid spread of the virus from one farm to the other is believed to be the result of the unplanned growth of the farms, which led to one farm's waste water flowing into the input source of the other farm.

The environmental and socio-economic impacts of the aquaculture industry were brought to the notice of the Supreme Court and resulted in judicial action. The Court gave a judgement in December 1996, which served as a severe set back to the shrimp aquaculture industry. It ordered the closure of shrimp farms in areas where they are not permissible under the Coastal Regulation Zone (CRZ). But even before the Court action, the industry nearly collapsed on its own.

[Source: Vivekanandan, V., and Kurien, J. "Aquaculture—Where greed overrides need". *Survey of the Environment—1998, The Hindu*, 1998].

Activity - Half a Story

Thrust Area	Environment and Development
Group Size	Up to 35
Time	1 hour

Materials 'Half-story' cards (see below), 25 plain cards (6" x 10"), pencils.

Objective

To facilitate thinking on the consequences in environment and development conflict situations.

Preparation

For this activity you will need 'Half-story' cards.

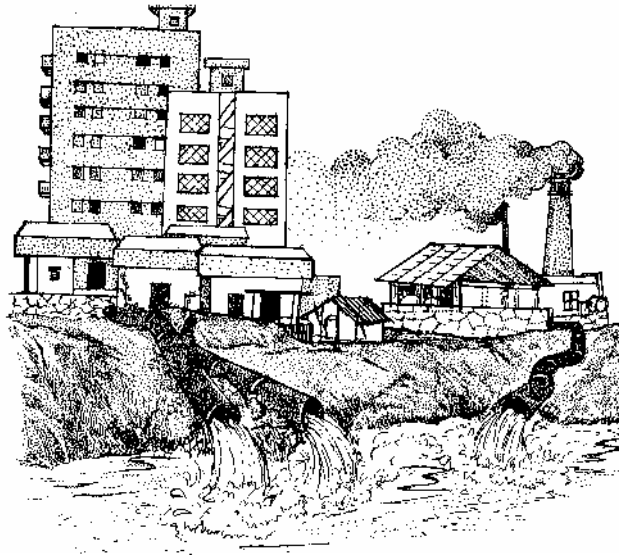
Five sample 'half-stories' are given here. Write each half-story on a sheet of paper taken from a note book or on a piece of chart paper cut to the size of an average note book.

1. The Nimipur Sanctuary occupies 550 sq km of an economically backward state. The sanctuary is mostly covered by bushes. The rest of the area is flat and dry, except in the monsoon when grass covers it. An extremely rare species of deer which is not found at any other place in the country lives in the sanctuary. The sanctuary is also home to the 'Pakari' tribe who have been living in the area for generations. The Pakaris are nomadic, moving from place to place in the sanctuary with their grazing herds. A large industrial house has approached the government for permission to start mining in the sanctuary and to build a big industrial complex in the area. It has been found that the land in the sanctuary has good deposits of minerals. Most of the Pakaris feel that the industrial complex will provide them jobs and end their poverty. Many people in the state believe that the industrial complex will attract other industries and bring economic development to the state. But there are protests from wildlife enthusiasts that mining and industry will destroy the only habitat of the rare deer. Some people feel that the industrial complex may not provide jobs to the unskilled, illiterate Pakaris. They feel that the traditional way of life of the Pakaris will also be in danger as the mining will destroy the land and grazing may no longer be possible.

2. The Harika River passes through the Girivar hills. The hills are covered with forests. Many dozens of tribal villages are nestled on the hills. In the valleys are located about a hundred small villages. The government is thinking of building a huge dam to generate hydroelectricity. The electricity will be useful in meeting the huge demand for more electricity in the growing cities and industrial complexes. The tribal communities and the villagers protest that the dam's reservoir will submerge their homes and fields. Environmentalists are concerned that the dam may not yield as much electricity and water as is promised after the initial few years, and that it will submerge vast areas of forest land. They also feel that the dam may increase chances of earthquakes occurring in the area.

3. Chetan Chemical Industries Limited (CCIL) is a large chemical factory that supplies chemicals to many industries in the state. More than 5,000 workers are employed in the industry. Waste water from CCIL finds its way into the nearby river. Villagers living downstream have been protesting that the waste water has ruined their agricultural lands, has been responsible for cattle deaths and has also caused skin diseases. The pollution control authorities have recommended that the industry should be closed down as it has

been causing severe pollution. The workers' union protests that if the industry closes down, they will lose their livelihoods.



4. Sarona is part of the growing Markutta city. The city's population is increasing rapidly and there is a great demand for houses for people. Sarona has also seen a number of housing complexes come up in the past two years. Sarona has a two square kilometer shallow lake. The lake is the only source of livelihood for fishermen and washer men who live along its banks. The grass growing along the lake banks is used by cattle grazers. The lake is also frequented by many water birds in the monsoon and winter months. A builder has proposed to the municipality that the lake be drained and a housing complex built over it. He has also offered to build a bus stop for the people of Sarona in one part of the drained lake if his proposal is accepted. The fisher folk, cattle grazers, washer men and members of the bird watchers club of Sarona are up in arms saying that the lake needs to be protected as it is an important source of livelihood and a safe haven for migratory birds.

5. The government of Surya Pradesh wants to build a massive information technology complex outside their capital. They believe that the information technology complex will attract many companies from all over the country and the world, and that this will provide jobs to the people of Surya Pradesh. The area selected for building the complex has about 2,000 trees. Scientists say that this area acts as a 'green lung' to the heavily polluted city.

Procedure

Divide the participants into five groups of about 5-7 persons each. Give one half-story card, five plain cards and a pencil to each group.

Ask each group to read the half-story written on their cards. Tell them that the half-stories represent different environment-development conflict situations. What they have to visualize is 'What is going to happen?' Each group has to think of five possible ways of completing the half-story, and write each different ending on a separate plain card.

They may also illustrate each of their stories with drawings or with pictures cut from old newspapers and magazines.

Give the groups 30 minutes to complete the task.

Ask each group to display their stories on the floor or on the notice board, with all their possible endings. When all the stories have been put for display, the participants can go around the room to look at the stories. The other groups can comment upon or add new ideas to the stories.

Discussion

How do developmental decisions impact the environment?

Decisions that consider only short-term economic gains may result in long-term environmental, social and economic losses. For example, large-scale hydroelectric projects may provide employment, electricity and water for irrigation, but often are not viable in the long run. They may lead to dislocation of people, and usually cause significant environmental damage.

Decisions which affect the environment should be made after considering all the possible consequences of each alternative. Cost-benefit analysis should incorporate environmental and human considerations as well as economic ones.

Why should we integrate environmental concerns with development concerns?

When environment and development concerns are merged, a better set of goals evolves. This includes a better quality of life, satisfaction of basic human needs, sustainability of development, respect for the biosphere and concern for the needs of future generations. Human well-being is dependent on the well-being of the environment. If we allow the quality of our environment to deteriorate, ultimately, it is the quality of the human condition which will decline.

What could be the principles to guide decision making in environment and development conflicts?

Resolving environment and development conflicts is not easy. There are trade-offs to be made. For example, if a heavily polluting industry repeatedly flouts pollution control norms, it may have to be shut down. This will lead to the workers of the industry losing their jobs. There are no ready-made answers to these conflicts, but some broad guidelines may help in resolving them:

1. Information dissemination: Information on all aspects of the project including justification, costs, alternative options evaluated, the possible impacts and the proposed remedial measures, etc., need to be widely disseminated. Information presented in a highly technical format may not be of use to people who may not understand the technical terminology used. It is crucial that information has to be presented in a manner that can be understood by all people who affect and are affected by the project.

2. Involving all relevant groups: All the groups of people who affect and/or are affected by the project—for example, the implementation agency, the project affected persons, NGOs, the scientific community, etc., have to be involved in efforts to find solutions to conflicts. The interests of all these groups need to be represented and considered.

Indicator Eggs

Before We Begin

How do we know if we are making progress towards Sustainable Development?

The starting point for answering this question is a world view which shows the relationship between human societies and the ecosystem.

One model comprises people within the ecosystem. It also includes the interactions between the people and the ecosystem. The interactions consist of flows from the ecosystem to people—both benefits (life support, economic resources, etc.), and stresses (natural disasters); and flows from people to the ecosystem—both stresses (resource depletion, pollution, etc.), and benefits (conservation).

People depend on the ecosystem which surrounds and supports them, much as the white of an egg surrounds and supports the yolk. A healthy ecosystem is no compensation if people are victims of poverty, misery, violence or oppression. Just as an egg can be good only if both the yolk and white are good, so a society can be healthy and sustainable only if both people and the ecosystem are well. Human well-being is a requirement for sustainability because no rational person would want to perpetuate a poor quality of life. Ecosystem well-being is a requirement because it is the ecosystem that supports life and makes possible any quality of life. Both human and ecosystem well-being are equally important and a sustainable society needs to achieve both together. The goal for every society is thus to improve and maintain the well-being of people and the ecosystem. How can we know if we are moving towards this goal?

For this, we will need indicators. An Indicator is a pointing or directing device. It is an instrument that indicates the condition of something. For example,

Body temperature is an indicator of health.

The IQ is an indicator of intelligence.

The GNP is an indicator of wealth of a nation.

The percentage of children in school is an indicator of education.

Indicators can be used at different levels. Some indicators are used at the individual level and tell us about the well-being of an individual. For example, the weight and height of a baby in relation to its age tells us about its nutrition and development.

The BOD (Biological Oxygen Demand) is an indicator of the health of a water body.

Some indicators are applicable at the community level. For example, the percentage of children in a village attending school is an indicator of the literacy in the village. The area of degraded village common lands is an indicator of the well-being of the environment of a village.

Some indicators are used at the national level. For example, the life expectancy of the people in a country is an indicator of the status of health of its people. The forest cover is an indicator of the well-being of the environment of a nation.

Indicators can tell us how a society is progressing towards the goal of Sustainable Development. Every indicator sends a signal: the more indicators we have, the better the assessment we will be able to make.

Spotlight

Hot Indicator?

The city of Bangalore known for its salubrious climate has shown a slight increase in maximum and minimum temperatures, thanks to urbanization in and around Bangalore.

Out of 25 years, the monthly maximum temperature during April was above normal in 20 years and the increase was more than 1 ° Celsius in the last 10 years. The increase of 0.5 to 1 ° Celsius temperature was mainly due to rapid industrialization and burning of large quantum of fossil fuels in recent decades. Even the maximum temperature has shown an increase by 1° Celsius most of the months.

Bangalore city has witnessed an unprecedented growth on all spheres in the last two decades. Multi-storeyed buildings and apartments have come up on open grounds and the vehicle population has increased many fold. The amount of carbon dioxide and other effluents from industries released to the air was also the main reason for increase in temperatures.

Dr H. R. Hatwar, Director-in-Charge, Indian Meteorological Department, told Deccan Herald that it was true that there was increase in maximum and minimum temperatures of Bangalore city. He said that all observational evidence had shown that the atmosphere was responding to man-made activities and the consequences may not be beneficial for mankind.

He said that temperature varied from one region to another depending upon the extent of greenery. Normally the temperature in village and forest areas was much cooler compared to cities, where the concentration of industries and human habitation was more.

The normal maximum temperature in Bangalore during April should be 32.3° Celsius. But the temperature recorded during that month from 1970 has always been higher than this.

Dr Hatwar said that judicious policies had to be evolved to safeguard nature's balance so that a better living atmosphere was created for future generations. By changing strategies pertaining to energy, afforestation and population, undesirable changes in the atmosphere can be reduced.

(Source: Vattam, Shyam Sundar. "Rapid Growth making Garden City Warmer". *Deccan Herald (Bangalore)*, 11.04.97).

Activity - Indicator Eggs

Thrust Area	Indicators of Sustainable Development
Group Size	About 20
Time	30 minutes
Materials	Copies of 'EGG' (see below), one for each group of 4-5 participants. Copies of Case Studies (see below)

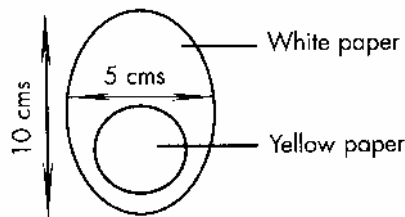
Objective

To orient participants to the use of indicators in assessing progress towards Sustainable Development.

Preparation

For this activity you will need to do the following:

- a. Make the 'EGG': Cut a white piece of paper in the shape of an egg. It can be about 10 cm tall and about 5 cm wide. ; Refer to the illustration given. Cut a circle of yellow paper (about 3 cm in diameter) and stick it on the white paper as shown.



- b. Copy the following case studies. One case study is to be given to each group of 4-5 participants.

Case study 1: Viratpur

Viratpur is a small community located along one side of a lake. This is what the people of Viratpur say:

Man

Ours is a poor community. Most of the men here work as daily labourers, watchmen or peons. Most of the women also work as domestic helpers in apartments on the other side of the lake. What else can we do? Less than twenty of us have been to school. Only about twenty children go to school even today from Viratpur.



Person living in apartment across the lake

The people of Viratpur are a nuisance. They use the lake shores for their toilet needs! They even dump garbage on the lake shore. The whole place stinks. I heard that about five years ago the lake used to be home to many water birds. But now you hardly see any

birds here. From time to time we see dead fish floating on the lake surface. Even fish can't live in a lake that is so dirty!

Health worker

Nearly half of Viratpur's population has some gastro-intestinal problem at any point of time. This is only to be expected. Very few houses have water supply. The rest take water for drinking, cooking and other daily needs from a bore well close to the lake. Less than one fourth of the houses here have toilets. Malaria is another problem increasing in its seriousness. The shallow waters along the lake edges have become a breeding ground for mosquitoes.

Case study 2: Megatta

Megatta is a large and fast growing metropolitan city. Here is what the people of Megatta have to say about their city:

Traffic Policeman

I think the number of vehicles in this city is growing by the hundreds each day. Naturally there is also an increase in the air pollution levels in the city. I have been a traffic policeman for the past seven years. I do not like the work, but I get an OK salary, so I can't leave it either! I have severe bouts of cough and the doctor says it is because of my exposure to vehicle smoke.

Housewife

Our city has many facilities that many other cities do not have. We have piped gas that comes right into the kitchen for example, so no trouble of waiting for gas cylinders. We also have good telephone lines, uninterrupted water and electricity. The only problem is this haze which wraps the city in the evening. It is terrible, in some places it is difficult for us to see even five metres ahead of where we are standing.

Senior citizen

This city is dying. The younger folk think that it is one of the best cities in the country, but that is because they have not seen the city in its earlier days. What is left of the city's past glory today? The lakes that dotted the city have been drained to build apartments. Trees have been cut down for timber and for making roads. There are hardly any green lungs in the city, and you can see the result—the city is choking!

Municipal Official

We try our best to serve the city, but it is a very difficult job. The number of people in the city is increasing each year, but our civic facilities cannot keep pace. How many more houses can we build in this limited space? Where will we get clean water to supply to all citizens? How and where will we dispose the wastes that these people create? Today things may seem alright, but tomorrow will be a problem!

Young man

This city is simply amazing! The standard of living is high. Nowhere in the country will you get such high salaries. The shopping places, public transport facilities, schools and entertainment places are all great! This city is full of life and never seems to sleep!

Case study 3: Adilapur

Adilapur is a tiny hamlet bordering a famous national park. Here is what the people of Adilapur have to say:

Headman

Life is miserable here. Our people are not allowed to enter the forest at all. We have been dependent on the forest for generations—for fuel wood, fodder, medicinal plants, fruits, etc. Now they make it a national park and say we can not enter it or use it. What do we do now?

Woman

I used to go to the forest each day to collect fire wood. Now the forest guards drive me out whenever they see me. If I do not collect fire wood how will I light the stove? Earlier I was free to go into the forest. I could also collect small fruits and roots. These would help my family survive when the crops failed.

Farmer

Farming on the edge of the jungle is not an easy task. First of all there is very little land available for farming. This is also under the threat of being swallowed by the national park which the government is planning to enlarge. Deer from the forest are a big menace to our crops. They come in herds and feed on crops waiting to be harvested. All the hard work we put in for months goes waste! A bigger problem is with the big cats in the jungle—the tigers and the leopards. They attack our cattle and goats. And we are not allowed to harm these animals because they are ‘protected animals’! Who will protect our crops and cattle?

Forest Officer

This national park is one of richest places in the country in terms of the variety of plants and animals found here. It is also home to some very rare species of plants and animals. We have been protecting the park strictly night and day. People from the nearby villages do sometimes try to enter the park illegally and take away wood and grass. They seem to be totally ignorant about the fact that this park is a national treasure.

Case study 4: Shantinagar

Shantinagar is a small village. Here is what the people of Shantinagar say about their village:

Community elder

We are a community of about fifty households. All adults in our village participate in taking decisions. That is how we managed to do so much—start a school and a health center, dig wells, etc. We are a peaceful community. During festivals we organize dance and song each evening under the huge neem and banyan trees in the village.

Woman

I work in the fields and at home. I am also on the Panchayat and take decisions along with the male members. Two major decisions that I got the Panchayat to take were that

all children in the village should go to school and that no tree in the village should be cut down without permission from the Panchayat.

Man

I am a farmer. I also manage the village fuel wood plot. I make sure that people do not steal wood from the plot. We harvest only the required amount of wood at specific times and distribute it to all villagers. The panchayat pays me for protecting the plot.

Child

I love playing with my friends near the lake next to our village. It is cool and breezy there. There are huge trees where we put our swings. We also see lots of birds, squirrels, mongooses and turtles there.

Procedure

Divide the participants into four groups of about 4-5 participants each. Give one case study and one 'egg' to each group.

Tell the groups that the egg has two portions. One white and the other yellow. The yellow is surrounded on all sides by the white and is supported by it.

The yellow portion represents the well-being of people. The white portion represents the environment which supports and sustains people.

Only when both the white and the yellow portions of an egg are healthy, is the egg fine. If any one of the portions is spoilt, the egg is spoilt.

Similarly, only if both the environment and the people in it are in a state of well-being, is the system fine. If any one of these is in an unsatisfactory state, the whole system is not in a state of well-being.

Tell the groups that in this activity they will use the eggs to indicate the well-being of the places mentioned in their case studies.

The first task for each group is to read the case study and discuss it among themselves.

Ask the groups to look out for information in their case study that will tell them about the well-being of the people. The participants may use specific indicators from each case.

For example, the health worker of Viratpur says that nearly half of Viratpur's population has some gastro-intestinal problem at any point of time. The woman of Shantinagar says that she is on the Panchayat and takes decisions along with the male members. These bits of information from each case study 'indicate' to us the well-being of the people. They are 'indicators'.

If the group feels that in their case the people are in a state of well-being, they leave the yellow portion of the egg as it is. If they feel that the people are in an unsatisfactory state (that is, if they are poor, uneducated, have threatened livelihoods, bad health, etc.) they colour the yellow portion according to the severity of the problems. For example:

Severe - Black (solid colour with a pencil)

Serious - Grey (heavily shaded with a pencil)

OK, but danger signals - lightly shaded with a pencil

Similarly, they also have to look out for information in their case study that will tell them about the well-being of the environment.

For example, the housewife in Megatta mentions a haze that wraps the city in the evening. The child from Shantinagar mentions huge trees, birds, squirrels and other animals near the village. These bits of information 'indicate' the state of the environment.

If they feel that the environment in their case is in a state of well-being, they leave the white portion of the egg as it is. If they feel that the environment is not in a state of well-being (that is, if it is degraded, polluted, etc.) they colour the white portion according to the same criteria they used for the yellow portion.

Give the groups 15 minutes for this activity.

After this time, ask one representative from each group to show the group's egg, read out their situation and present why they have coloured their egg as they have.

Discussion

How many eggs represent systems which are in a state of well-being? And how many are in an undesirable state? Why?

In the case of Viratpur, both the people and the lake are not in a state of well-being. The people are unhealthy, uneducated and poor. They also do not have facilities such as sanitation and water supply. The lake is polluted.

In Megatta, the people have good facilities (water, electricity, communications, etc.) and enjoy a high standard of living. But this may not last for long, as the municipal officer says. The environment is not in a state of well-being.

In Adilapur, the environment seems to be in a state of well-being with rich diversity of species. But the well-being of the people is a problem. They do not have access to resources and their livelihood is threatened.

In Shantinagar, both the people and the environment seem to be in a state of well-being. Both the men and the women participate in securing facilities (school, health centre, wells, etc.) for themselves. They have also managed to conserve their environment and use its resources wisely.

What information about your city/village would give an idea about its well-being?

Ask the participants to brainstorm and put together a list of indicators for their city/village—for both human well-being and environmental well-being. For example, will the number of trees be an indicator for the well-being of the environment? Will the number of bus stops be an indicator of the well-being of the people? They should be able to come up with at least 10 indicators for human well-being and 10 indicators for environmental well-being.

Section two



How Many Here?

Before We Begin

The carrying capacity of an ecosystem is the maximum population of a given organism that the system can hold without being degraded. There is a carrying capacity for the biosphere, for each ecosystem and for each habitat, at any given time.

The carrying capacity of a system is affected by many variables. It varies with environmental conditions (e.g., drought lowers the carrying capacity of an ecosystem). It can also be influenced by the management or mismanagement of resources.

Overpopulation occurs when the population exceeds the carrying capacity of the environment. The human population, like other populations, is ultimately limited by the biosphere's carrying capacity. Humans use technology to manipulate their environment to increase its capacity to meet their needs. But today, as we reach what appear to be critical thresholds of the biosphere, we are realizing that humans must adapt to the environment and not vice versa.

When a population increases beyond the carrying capacity of its habitat, the environment deteriorates and the population may decline sharply until a new equilibrium is reached. Increases in population and sudden introduction of a team and concept could, if unchecked, outstrip the capability of the biosphere to support life.



Spotlight

Too Many, Too much...Can Krishna take it all?

Krishna is one of the most important rivers in the water-starved Indian peninsular region. It is an inter-state river traversing a length of 1,400 kms through the states of Maharashtra, Karnataka and Andhra Pradesh before draining into the Bay of Bengal.

The basin of the river encompasses Hyderabad, the fifth largest metropolitan city in India and also important towns and cities like Pune, Satara, Sholapur, Kolhapur, Bijapur, Belgaum, Raichur and Kurnool and drains numerous fast growing urban-industrial settlements.

The total population living in the Krishna basin is over six crore. Of this, the urban population is over two crore. With urbanization increasing at the rate of 40 per cent on an average in the last decade, it is inevitable that organized abstraction of urban water supplies has also been growing. Besides water needed for domestic purposes, water has to be provided for various utility services such as hospitals, community centres, commercial centres, fire fighting and water borne transport of sanitary and other wastes. Water is an extremely important industrial raw material needed as a component of process reactions and for cleaning, washing, cooling, etc.

The current estimated total annual water use in the Krishna basin works out to 39,869 mcm, of which 96 per cent is for irrigation, three per cent for domestic and municipal uses and one per cent for industrial uses.

The major contributor to pollution loads from community sources in the state of Maharashtra is Pune city. In Andhra Pradesh, the major pollution is from Hyderabad city and the river Musi. Most of the industrial pollution load in Andhra Pradesh comes from the industrial complex at Rangareddy and the distilleries situated at Vijayawada on the banks of the river.

The organic pollutant load from the rural sector is widely distributed over several thousands of villages in the catchments area.

A large fraction of the population in the river basin is ignorant of the implications of using poor quality waters for different uses including personal uses like bathing, drinking and cooking.

In Maharashtra and Andhra Pradesh, the entire reach of the River Krishna and most other streams of the system fail to satisfy the criteria for the uses specified for them. The quality problems arise because of the large quantities of the sullage and sewage waters flowing into the streams that feed the river. The problem is further compounded by large

diversions from the streams for irrigation, leaving very little water in the streams for dilution.

To restore the present deteriorated water quality to a reasonably better and acceptable level, the area needs immediate attention.

(Source: Bhardwaj, K. “Urban industrial hubs spoil Krishna’s course”. *Statesman (New Delhi)*, 13.07.98).

Activity - How Many Here?

Thrust Area	Population
Group Size	15 to 25
Time	1 hour
Materials	Fuel wood cards (see below)

Objective

To help the participants understand the concept of overpopulation in terms of the carrying capacity of an area.

Preparation

For this activity you will need to prepare cards to represent fuel wood and green wood.

Details of cards to be prepared (only one side of each card is to be marked):

- 50 cards marked ‘500 grams’ (to represent fuel wood of weight 500 grams each)
- 25 cards marked ‘ 1 kilogram’ (to represent fuel wood of weight 1 kilogram each)
- 15 cards marked ‘2 kilograms’ (to represent fuel wood of weight 2 kilograms each)
- 9 cards marked ‘5 kilograms’ (to represent fuel wood of weight 5 kilograms each)
- 1 card marked ‘10 kilograms’ (to represent fuel wood of weight 10 kilograms)
- 20 cards marked ‘G’ (to represent green wood which cannot be collected)

All the cards should be the size of visiting cards and should look similar. (You could also use ice cream cups— cleaned after use—in the place of cards. In this case, you will need to mark the weights on the outside bottom of the cups.)

Procedure

Mark out a large area on the floor, with a stick or chalk powder.

Place the cards representing wood on the ground in the marked out area randomly, in such a way that the weights face the ground.

Tell the participants that the area marked out on the ground represents a wooded area near a village. It has fuel wood that can be collected and green wood that cannot be collected.

Each one of them is a fuel wood gatherer from the village and needs 10 kilograms of fuel wood, unless otherwise specified.

The cards represent pieces of fuel wood of different weights that can be collected. Each participant is allowed to collect a maximum of 10 cards.

Besides the fuel wood cards there are other cards marked with the word 'Green'. These cards represent green wood which cannot be collected.

Divide the participants into four groups.

The first group of participants are children and are physically not capable of collecting a large quantity of fuel wood. To represent this, they have to hop while they are gathering fuel wood.

The second group of participants are mothers with a baby in their arms. They have to use only the thumb and the little finger of their left hands to collect the fuel wood.

The third group of participants have families with 10 members each. They need to cook more food and need more fuel wood than the others. They have to collect 20 kgs each.

The fourth group of people have no special restrictions or requirements, and can collect the fuel wood cards normally.

On a signal, each one of the participants must start collecting the cards. As the maximum number of cards that each person can collect is limited to 10, the participants have to pick and choose between the cards. For example, if a person collects ten 'A' cards, they will not add up to the 10 kgs he/she may require. Pushing and shoving is not allowed.

When all the cards have been gathered, ask the participants to calculate the quantity of fuel wood they have gathered.

Discussion

How many kilograms of fuel wood did each participant gather?

How many participants could gather enough fuel wood to meet their requirements?

What is the total amount of fuel wood available in the area?

The total amount of fuel wood available in the area amounts to 135 kilograms.

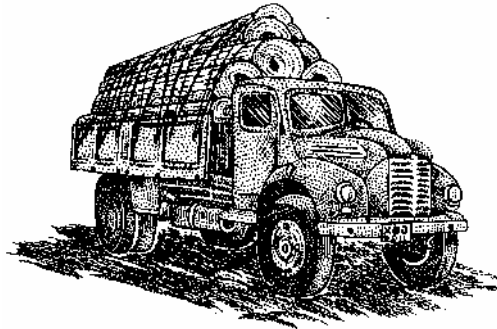
How many people's fuel wood requirements can the area support—that is, what is the area's carrying capacity in terms of fuel wood collection?

The total amount of collectable fuel wood in the area adds up to 135 kilograms. If each person needs 10 kilograms of fuel wood, the area can support the fuel wood requirements of 13 people. If some people need 20 kilograms of fuel wood, the area would be able to support fewer people.

Are the number of fuel wood collectors more or less than the number that the area can support? What happens when the number of fuel wood collectors exceeds the carrying capacity?

When the number of fuel wood collectors exceeds the carrying capacity of the wooded area, the following will be the consequences:

- only some of the fuel wood collectors will get enough fuel wood to meet their needs.
- the wooded area may get depleted. People usually collect small dry twigs and dead wood for use as fuel. When these are no longer available, they may have to use up wood from shrubs and trees as well. As long as the population of the fuel wood gatherers does not exceed the capacity of a local tree stock to replenish itself through tree growth, the people can exploit the resource indefinitely. But because the population keeps on increasing and the number of fuel wood gatherers keeps growing and at some point in time exceeds the carrying capacity of the wooded area, there is a problem. At this point the tree cover starts disappearing and the wooded area gets depleted.



What do the 'G' cards represent, and why did they have to be left uncollected?

The 'G' cards, which represent green wood had to be left uncollected. Fuel wood gatherers generally prefer collecting dry twigs, branches, etc. Only when these become scarce do they cut down green branches for fuel wood. Green branches are otherwise left unharmed as they are needed to renew supplies of dry fuel wood.

Variation

Instead of dividing the participants into groups, all of them can be asked to collect only 10 kilograms in the same manner (that is without hopping or folding hands).

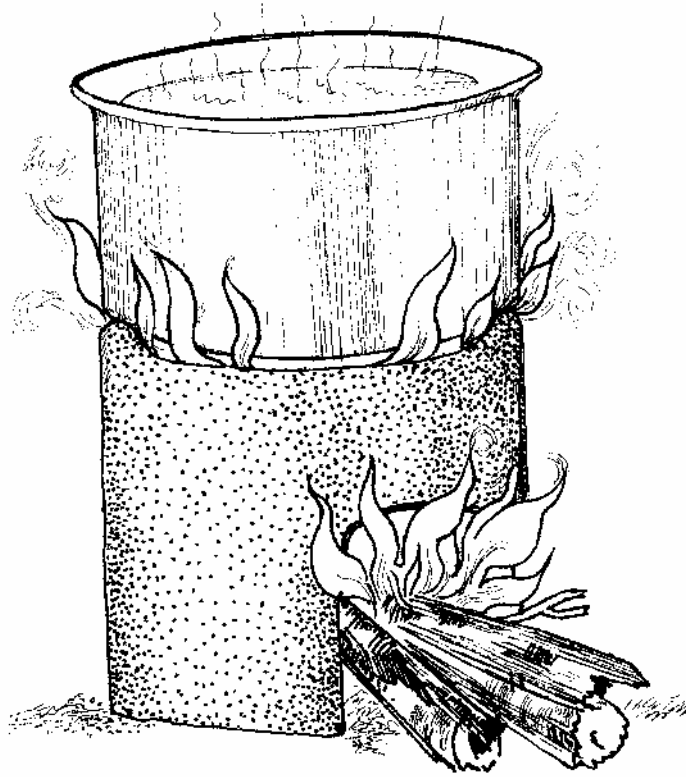
Instead of sending in all the participants to collect the fuel wood at the same time, the game can be played in 'rounds'. In the first round, five participants can be sent in for collecting fuel wood. After they have collected the wood, a note can be made of the amount of fuel wood collected by each person in the round. The fuel wood is then replaced.

In the second round, ten participants are sent in to collect fuel wood. Again the amount of fuel wood collected by each person is noted down, and the fuel wood is replaced.

In the third round, fifteen participants are sent in to collect fuel wood. The amount of fuel wood collected by each person is noted down, and the fuel wood is replaced.

In the fourth round, all the participants are sent in at the same time. The amount of fuel wood collected by each person is noted.

At the end of the activity, discuss the differences between the rounds. For example, how did the amount of fuel wood that can be collected by each person vary across different rounds? How did the number of persons whose requirements of fuel wood were met vary across different rounds?



Aladdin's Lamp

Before We Begin

Quality of Life refers to a combination of attributes that provide a sustained human experience of physical, mental, spiritual and social well being. These would include access to basic goods and services, security, justice, healthy human relations, opportunities, peace of mind, a healthy environment, etc. It is not possible to put an economic value to many of these.

The combination of factors that influence an individuals' life and its quality would vary from person to person and culture to culture.

Quality of life is not the same as standard of living. Standard of living refers to consumption of goods and services, which may not necessarily guarantee a better quality of life.

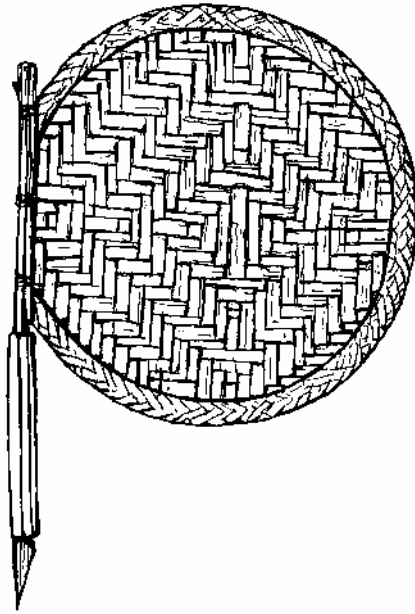
Spotlight

Our Life

Excerpts from a letter from Bava Mahalia of Jalsindhi village in Jhabua district to Madhya Pradesh Chief Minister Digvijay Singh in 1994:

“We are people of the river bank. We live on the banks of the great Narmada. You, and all those who live in cities, think that we who live in the hills are poor and backward, like apes.

We have lived in the forest for generations. The forest is our moneylender and banker. In hard times we go to the forest. We build our houses from its wood. From its rushes and splints we weave screens. From the forests we make baskets and cots, ploughs and hoes, and many other useful things... We get various kinds of grasses; and when the grasses become dry in summer, we still get leaves... If there is a famine, we survive by eating roots and tubers. When we fall sick, our medicine men bring us back to health by giving us leaves, roots, bark from the forest. We collect and sell gum, *tendu* leaves, *baheera*, *mahua*.



The forest is like our mother; we have grown up in its lap. We know the name of each and every tree, shrub and herb; we know their uses, [f we were made to live in a land without forests, then all this knowledge that we have cherished for generations will be useless.

The river too is our sustenance. The Narmada has many kinds of fish in her belly. Fish is our standby when we have unexpected guests. The river brings us silt from upstream which is deposited on the banks so that we can grow maize and jowar in the winter, as well as many kinds of melons. Our children play on the river's banks, swim and bathe there. Our cattle drink there throughout the year, for the river never dries up. In the belly of the river we live contented lives. We have lived here for many generations.

You city people live in separate houses. You ignore each other's joys and sadness. We live with our clan, our relatives, our kin. All of us pool together our labour and build a house in a single day, weed our fields, and do any small task as it comes along.

You tell us to take land in Gujarat. You tell us to take compensation. For losing our lands, our fields, for the trees along our fields... But how are you going to compensate us for the forests?... How will you compensate us for our river—for her fish, her water, for the vegetables that grow along her banks, for the joy of living beside her? What is the

price of this?... Our gods, and the support of our kin—what price do you put on that? Our adivasi life—what price do you put on that?”

(Source: “We will drown but we will not move”. *Frontline*, 04.06.99).

Activity - Aladdin's Lamp

Thrust Area	Quality of Life
Group Size	About 20
Time	30 minutes
Materials	Paper and pencils

Objective

To encourage the participants to think about what a better quality of life implies.

Procedure

Divide the participants into four groups. There can be up to five participants in each group.

Tell one group that they are poor farmers in a small village. The second group are people who live in a slum in a large city. The third group are housewives in a middle-income housing colony. The fourth group are business men in a large city.

Now, tell the groups that each one of them has stumbled upon a magic lamp which can make their wishes come true.

They are allowed to make five wishes for a better quality of life for themselves. The only condition is that they cannot ask for more money.

They have ten minutes to discuss within their group and come up with a list of five wishes. The wishes should reflect the roles they have been given.

After ten minutes, ask each group to present their list of five wishes to the rest of the participants.

Discussion

Was there a difference in the wishes of the different groups? Why?

There may be differences in the wishes of the different groups owing to their different backgrounds. For example, the people who live in a slum may ask for better facilities such as water and sanitation, while the group of businessmen may not ask for these. But there are also bound to be similarities. For example, more than one group may wish for good health, happiness, safety, peace, etc.

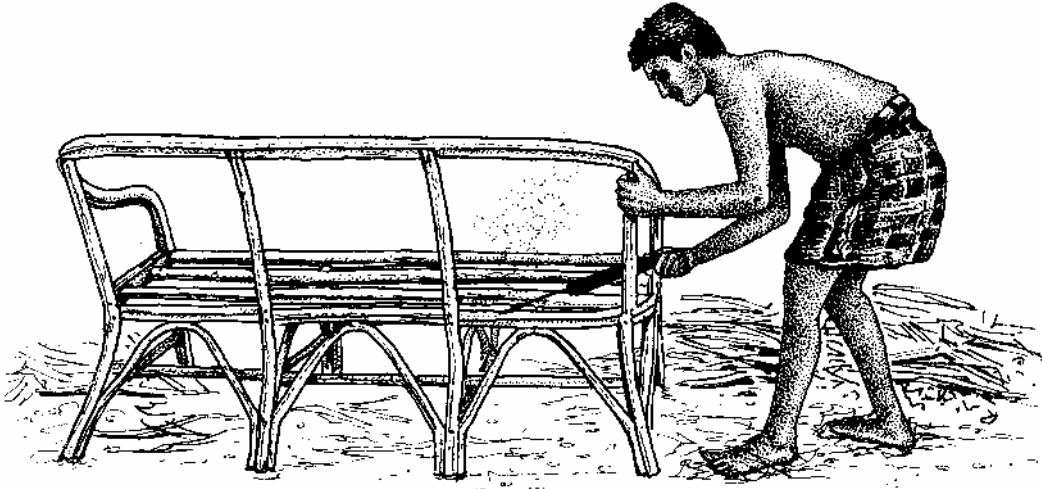
What does a better quality of life imply? Is it the same as a better standard of living?

Defining quality of life is not an easy task. But we may say that quality of life refers to our health and happiness. There is a difference between quality of life and standard of

living. Standard of living refers to our consumption of goods and services, which may or may not guarantee a better quality of life.

What is required to ensure that people have a better quality of life?

Economic growth may ensure a better standard of living but it may not necessarily lead to a better quality of life. A better quality of life would require human well-being and environmental well-being in addition to economic growth.



Count Down

Before We Begin

World consumption has expanded at an unprecedented pace in the twentieth century. The benefits of this consumption have spread far and wide. More people are better fed and housed than ever before.

Consumption clearly contributes to human development when it enlarges the capabilities and enriches the lives of people without adversely affecting the well-being of others. It clearly contributes to human development when it is as fair to future generations as it is to the present ones. And it clearly contributes when it encourages lively, creative individuals and communities.

But the links of consumption to human development are often broken. Today's consumption is undermining the environmental resource base. It is exacerbating inequalities.

One of the major causes of the continued deterioration of the global environment is the unsustainable pattern of consumption and production, particularly in the industrialized countries. Excessive demands and unsustainable lifestyles among the richer segments of humanity place immense stress on the environment. The poorer segments, meanwhile, are unable to meet food, health-care, shelter and educational needs.

Consumption must be shared, strengthening, socially responsible and sustainable.

- Shared - Ensuring basic needs for all.
- Strengthening - Building human capabilities.

- Socially responsible - So the consumption of some does not compromise the well-being of others.

- Sustainable - Without mortgaging the choices of future generations.

Achieving Sustainable Development will require changes in consumption patterns. Countries will have to:

- Find ways of making economies grow and prosper while reducing the use of energy and materials and the production of waste.

- Identify balanced patterns of consumption worldwide which the earth can support in the long term.

Governments should strive to:

- Promote efficient production and reduce wasteful consumption.

- Develop policies that encourage a shift to sustainable patterns of production and consumption.

It is important that individuals take responsibility for consuming goods and services in a sustainable manner.

If the trends continue without change - not redistributing from high-income to low-income consumers, not shifting from polluting to cleaner goods and production technologies, not promoting goods that empower poor producers, not shifting priority from consumption for conspicuous display to meeting basic needs—today's problems of consumption and human development will worsen.

Spotlight

Consumerism turning India into a Garbage Dump

In the good old days, there was the cloth shopping bag. We took it to the shops hundreds of times till it was torn. We did not have plastic bags to throw away. We drank tea in china cups or steel tumblers; no paper cups to litter the place. We did not have soft drink fountains with their disposable cups; we used bottles instead. An empty milk powder tin remained on the kitchen shelf for years as a store for sugar or gram. Milk was bought in clean glass bottles which were returned the next day; no plastic pouch to be thrown into the waste bin. We had handkerchiefs, washed and rewashed till they were torn; no paper napkins to throw away. Babies wore clean cloth diapers (usually made from grandmother's old soft sarees), washed and rewashed; no throwaways. Those days we did not waste.

In the new age of convenience consumerism, we may waste as much as we consume. We may pay more for the packaging than for the product. Nearly a quarter of India's precious energy is used for producing what ultimately turns out to be waste. According to the All India Food Preservers Association, the cost of packaging is about 55 per cent of the price of a product.



Guess What!

- If 50 persons in an office use both sides of just 10 per cent of the paper they use, the company can save ten trees a year.
- The energy saved from recycling one glass bottle will light a 100-watt bulb for four hours.
- If you line up all styrofoam cups made in just one day in the world, they will circle the entire earth.
- Plastic bags and other plastic garbage thrown into the seas kill a million sea creatures every year.

(Source: "Consumerism Turning India into a Garbage Dump". *The Week*, 02.10.94).

Activity - Count Down

Thrust Area	Consumption
Group Size	Up to 60
Time	About 30 minutes
Materials	Paper and pencil

Objective

Players will be able to distinguish between needs and wants.

Procedure

Divide the group into teams of 5-6 players each. There can be about ten such teams. Ask each team to be ready with a paper and a pencil.

Tell the players that they are escaping from their home town because of a sudden flood that has hit the town. Each team represents a family. Each family has time for taking just 20 things from their homes before they leave their town (and before their homes are destroyed by the flood). They are not allowed to take money. They do not know where they are going, when they will reach another place where they can find help, and what facilities and services they may get at the new place. They also do not know when, if at

all, they will return to their town and whether their homes will be standing. Which are the twenty things the family will choose to take? Give the players five minutes to discuss and make a list of the twenty things.

After the players have made the list, give the next instruction. Tell them that the truck which is to take them out of the town is already overloaded, and so they have to drop any five of the 20 things they have with them. Which five will they choose to drop? Ask the players to strike off from their list, the five things. On their way out of the town the truck has a break down and everyone has to walk. They cannot carry 15 things, as the walk is too long, Which five things will they discard now? Ask the players to strike out five more items from the list. On their way they are stopped by a gang of dacoits who demand that they part with any five items out of the ten they carry. Which five items will they give up? Ask the players to strike out five more items from the list.

Finally each team will have a list of five items. Ask them to read out their original list and their final list of five. If there are only a few teams (up to five) you may be able to write these on the board.

Extension

The players may be asked to make a list of the things they own which they can easily do without.

Discussion

Are the five things the team came down to, the things that they need the most?

The five things that the teams finally choose to keep will be the things that they feel they need the most. These may include food, water, medicines, blankets, legal documents, etc. Some of the five items may be common across different teams.

What other things did the first list of twenty contain?

The first list of twenty may contain many things which may not be really be 'needed' but which the teams feel they 'want'. For example, some teams may mention things like tape recorders, toys, etc.

What is the difference between needs and wants?

Needs are absolute necessities one cannot do without. Basic needs are common to people across the world. They include food, water, shelter, clothing, recreation, social interactions, etc. Wants, unlike needs, depend a lot on the social and economic background of the person. A city executive's wants may include a personal computer. A farmer's wants may include a better plough. The quality and quantity of our consumption defines if we are catering to our needs or to our wants. A balanced diet consisting of cereals, pulses, vegetables etc., is a need, while a meal consisting of *pulao*, sweets, ice cream, etc., may be a want.

How does our consumption of goods and services affect the environment?

Our life-styles can affect the environment in significant ways. Highly consumptive lifestyles have greater impact on the environment through their extensive use of resources. Sometimes, even simple lifestyles, such as those of herdsmen, can affect the local environment (e.g., when their cattle overgraze).



For the Common Good

Before We Begin

Common Property Resources (CPRs) are natural resources which are valued by society but are not owned by individuals. These include resources such as the atmosphere, water courses, fisheries, wilderness, etc. The key aspect of a CPR is that it can be used free of charge by any member of the society wishing to use it.

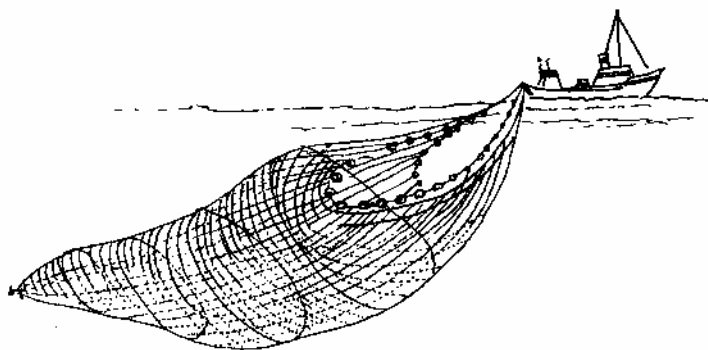
Growing population, over exploitation and poor management lead to degradation of CPRs.

It is necessary to manage CPRs such as forests, grazing lands, water bodies, etc., so that they produce sustained yields, unimpaired by periodic harvests.

Spotlight

Ocean fish resources depleting fast; FAO

Oceans are being over fished to such an extent that they may, within the next 20 years or so, become an inadequate source of food for the earth's rapidly growing population, according to a report by the UN Food and Agriculture Organization (FAO).



Many developing countries, dependent on fish for food, fear the consequences of over fishing. At the same time, some developed states that fish in distant waters have high

consumption rates and a large domestic market to satisfy; others such as Iceland, depend economically on access to particular fisheries which they have worked for centuries.

Around 70 per cent of conventional species of fish are overexploited. Landings of the Atlantic cod, which for decades amounted to around 2.5 million tonnes a year, have slumped in the 1990s to scarcely half that. Other important species such as haddock, flounder and shrimp, are all declining because of over fishing.

According to FAO, fishermen may actually catch and discard some 27 million tonnes of fish each year. The discards occur when boats trawling for a particularly valuable species catch fish of lesser value that do not seem worth the ice and storage space. This 27 million tonnes would be enough to supply the entire Chinese population for a year and a half.

The global catch, which rose five-fold between 1950 and 1989, has since been falling and is now around 100 million tonnes a year. In areas where there is traditionally a good deal of fishing, fishermen are illegally catching small, young fish, selling them and thus depleting stocks further.

Very many people depend on fish to stay alive. In Asia alone, 1,000 million rely on Fish as their main source of animal protein. Cheap and easily available, fish keep malnutrition at bay.

(Source: "Ocean Fish Resources Fast Depleting: FAO". *The Business and Political Observer (New Delhi)*, 04.01.96)

Activity - For the Common Good

Thrust Area	Common Property Resources
Group Size	Up to 10
Time	40 minutes
Materials	Paper fish - 100 (see below), music making instrument (bell, metal spoon and tin, tape recorder, etc.)

Objective

To help the players determine consumption strategies that will contribute to conserving a common, renewable resource.

Preparation

Paper fish (100): You can make these by cutting up thick paper (old cartons, visiting cards, chart paper, etc.) in the shape of fish. Each fish can be about three inches long and about one inch wide. You can also use other small objects as fish. For example, the metal crowns of soft drink bottles, pebbles, etc.

Procedure

Ask the players to sit in a circle. In the centre of the circle, at least three meters away from the players, place one-fourth of the fish (25).

Explain the following rules to the players:

The fish belong to all of them. Each one of the participants needs a minimum of 10 fish to survive.

Music will be played for 30 seconds, and while it is playing everybody may take fish from the pool in the centre.

As soon as the music stops, you will double the number of fish left in the pool at that time, and then continue the game.

The game will continue for five rounds. At the end of the five rounds, each participant must have at least 10 fish.

There will never be more fish in the pool than there are at the start of the game. The maximum number of fish the pool can hold is 25 at any point of time.

The participants may not talk to anyone during the game.

Start the game by playing music for 30 seconds. In all likelihood, the pool will be depleted before the music stops. As there may not be any fish left in the pool, you will not be able to take the game further by doubling the number of fish. Tell the participants that this game ended as there are no fish to double and take it into the next round. Ask how many participants managed to get the ten fish they require. Make a note of this.

Tell the participants that you will start the game all over again. Ask all the participants to put back the fish they have taken (check if there are 25 fish). Remind the participants that they are not allowed to talk to each other. Play the music for 30 seconds. Just as in the last time, the pool may be depleted before the music stops and you will not be able to take the game further. Ask how many participants managed to get the ten fish they require.

Tell the participants that you will start the game once again. Ask all the participants to put back the fish they have taken into the pool (check if there are 25 fish). This time tell the participants that they CAN talk to each other. Give them two minutes to discuss and ask them to develop cooperative strategies that will allow more players to accumulate 10 fish. Play the music for 30 seconds. This time there are chances that the participants will leave some fish in the pool. Tell the participants that as there are some fish left behind in the pool, they can be doubled and the game can continue into the next round. Ask how many participants managed to get the ten fish they require. Count the number of fish left in the pool and add an equal number to double the number of fish. Remember that even after the doubling, the total number of fish should not exceed 25.

Give the participants two more minutes to discuss and play the music for 30 seconds. Ask how many participants managed to get the ten fish they require. Count the number of fish left in the pool when the music stops. Double the number by adding an equal number of fish.

Repeat the above step three more times.

At the end of the third time, take a final count of the number of participants who have been able to get the 10 fish they require.

Discussion

What happened in the first two games?

In the first two games, the pool may be depleted before the music stops. That is, there may not be any fish left in the pool to be doubled and used for continuing the game.

What happened the third time the game was played?

The third time, the participants are allowed to talk and develop plans for taking fish in such a way that some remain to be doubled. This way the game continues and more people have a chance to meet their requirements.

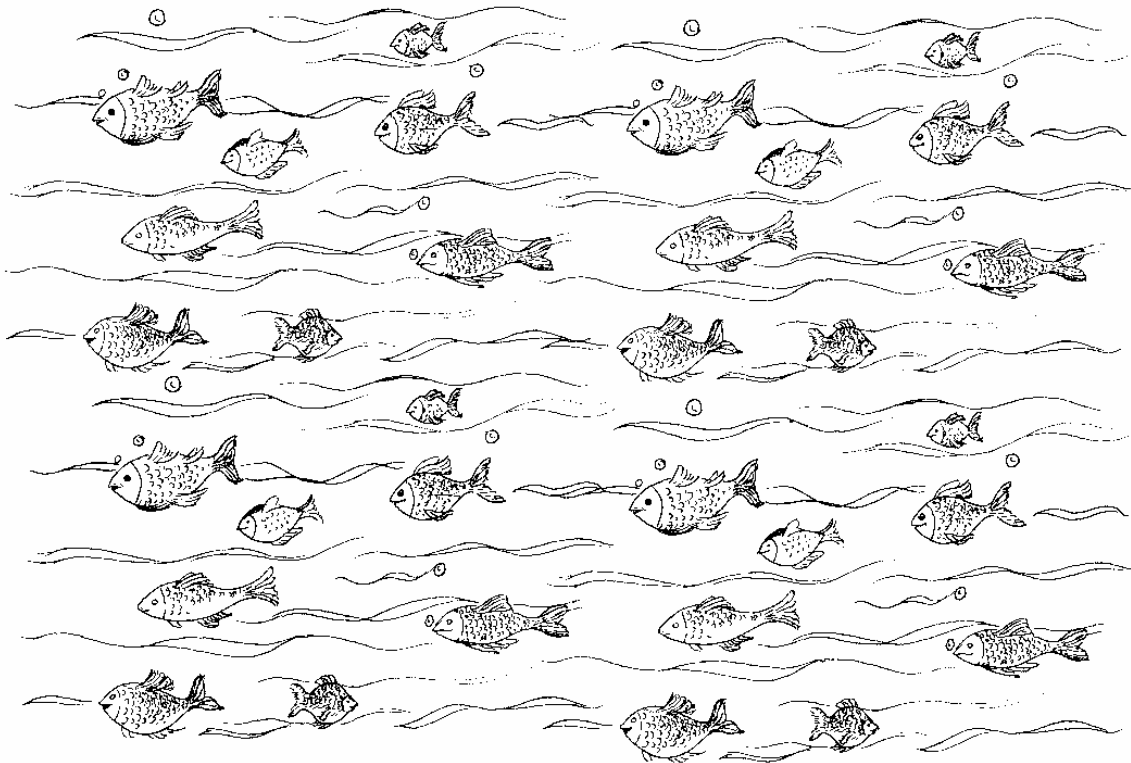
What are the common resources we have? How do we use them?

Forests, water sources, air, etc., are some of the common resources we have. These resources act as sources for our developmental activity and as sinks for our waste. For example, grasslands give us fodder for cattle and rivers often act as the sink for the waste water we throw out.

Common property resources are generally not priced, and all people have a right to use them. This advantage has also led to misuse and overexploitation of common property resources. For example, in many places in the country, overgrazing is a problem. Many rivers in the country are also dumped with large amounts of untreated wastes, resulting in pollution.

How can we ensure sustainable use of common property resources?

Common property resources require common management strategies. Plans to manage land use, water use, use of plant and animal species, etc., both at present and in the future have to be developed through cooperative processes.



Tales Tails Tell

Before We Begin

Industry produces things people want and need. Decisions of individuals can influence what products are made. If people choose to reject a product which harms the environment in its manufacture, use or disposal, there will be a decrease in the demand for that product. The industry will not continue manufacturing a product which does not have a good demand-Mass manufactured products are 'cheap' because of the economies of scale (e.g., bulk buying will make possible to get raw materials cheaper). But the environmental and social costs of mass production may be high.

Large quantities of natural resources may be essential for manufacturing processes. For example, the production of a kilogram of steel requires 250 litres of water, and the production of a kilogram of synthetic fibre requires 20,000 litres of water.

Certain manufacturing processes may create pollution.

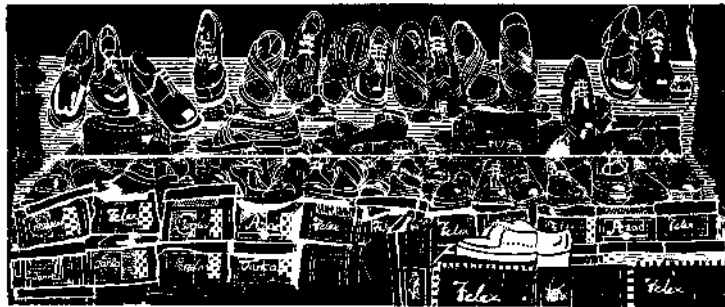
Spotlight

A Shoe Story

Eighty per cent of athletic shoes in the United States are not used for their designed purpose. According to surveys, U.S. women own between 15 and 25 pairs of shoes, men 6 to 10 pairs. Americans spend twice as much on children's athletic shoes as they do on children's books.

My two shoes weighed about a pound and were composed of dozens of different, mostly synthetic, materials. Like almost all athletic shoes sold in the U.S., they were manufactured overseas by an obscure firm contracting to the company whose name and logo actually appeared on the shoes. Mine were assembled in a Korean-owned factory in Tangerang, an industrial district outside of Jakarta, Indonesia. But almost all the component parts were made elsewhere.

The shoe company in Oregon specified the shoe's high-tech design and materials and relayed the plans by satellite to a computer-aided-design firm in Taiwan. This firm faxed plans to engineers in South Korea.



Leather

My shoes had three main parts: the logo-covered upper, the shock-absorbing midsole, and the waffle-treaded outsole. The upper had about 20 different parts. It was mostly cow-leather. The cow was raised, slaughtered, and skinned in Texas. Most of the carcass became human and pet food. The hide was cured with salt and stacked with 750 others in a 20-foot container and carried by freight train from Amarillo to Los Angeles. From there it was shipped to Pusan, South Korea. Most US hides are exported for tanning as labour costs and environmental standards are lower overseas.

Tanning usually is a 20-step process with large spinning drums and solutions of chrome, calcium hydroxide, and other strong chemicals. Workers in Pusan loaded the tanned leather onto an airplane headed to Jakarta, while the tanning plant discharged hair, epidermis, leather scraps, and processing chemicals into the Nakdong River.

Synthetics

Except for the leather, my shoes are made from petroleum-based chemicals. The midsole was a custom designed EVA (ethylene vinyl acetate) foam: a composite of several substances including ethylene. The ethylene was distilled and “cracked” from Saudi petroleum shipped in a tanker to a Korean refinery.

Rubber

My shoes’ outer soles were made of styrene-butadiene rubber. The rubber was synthesized from Saudi petroleum and local benzene (made from coal) in a factory in Taiwan. The Taiwanese factory got its electricity from one of the island’s three nuclear power plants. The rubber was formed into large sheets and flown to Jakarta. In the shoe factory, machines cut up the sheets and molded the grooved tread that I see at the bottom of my shoe.

Assembly

The factory in Tangerang manufactured shoes for Adidas, Nike and Reebok. The three brands are not terribly different from each other except for the logo and which athlete was paid to endorse them.

Powerful machines used pressure and sharp blades to precisely cut the leather and other tough materials into shoe parts. A Japanese-made embroidery machine speed-sewed the corporate logo on the side of my shoes.

Though high-tech equipment helps, putting shoes together remains the domain of hand labour. On the assembly line many young Javanese women cut, sewed, and glued my uppers and soles together to make shoes. The air smelled of paint and glue, and the temperature neared 100° F.

Though solvent fumes caused health problems for some workers, the shoe factory generated little pollution and required little energy compared with refineries, chemical plants, and tanneries that produced its raw materials.

Shoe Box

My shoes were hand stuffed with light weight tissue paper (made from Sumatran rain forest trees) and put in a shoe box. The box was corrugated cardboard that was 100 percent recycled and unbleached. Folded stacks of empty boxes were shipped west across the Pacific from Los Angeles; boxed shoes were shipped east in a super container ship carrying 5,000 20-foot containers. Each journey took three weeks.

As I laced up my shoes, I noticed a small tear over my big toe. At this rate, the pair wouldn't last a year. Maybe I could make my shoes last longer, walk more softly on the earth, and save 75 bucks, too.

[Source: Ryan, John C., and Durning, Alan Thein. *Stuff: The Secret Lives of Everyday Things*. Seattle: Northwest Environment Watch, 1997]. <http://www.northwestwatch.org>.

Activity - Tales Tails Tell

Thrust Area	Environmental Impact of Products
Group Size	Less than or about 50
Time	30 minutes
Materials	Plain cords or pieces of paper (the size of visiting cards), stapler with pins or reel of thread (one for each group), pens/pencils, OR large floor space, chalks of different colours. Assorted pairs of items used in every day life to fulfil a single need. One of the items should be a processed product and the other, a commonly found environmentally friendly alternative. For example: A Packet of Red Chilli Powder and Red Chillies A Plastic Container and an Earthen Container A Tooth Brush and a Neem Twig

Objective

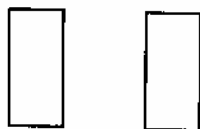
To help participants become aware that a number of natural resources go into the manufacture of processed goods.

Procedure

Divide the participants into groups of 5-7 persons each. Give one pair of items to each group. For example, one group will be given the Packet of Red Chilli powder and a few Red Chillies. Another group will be given the Plastic Container and the Earthen Container, etc.

Assign each group a large area in the room. If you would like the groups to use the floor as the writing surface, give each of them chalks of different colours. If the floor cannot be used for writing, then give each group about 50 cards/paper pieces, and pens/pencils to write with.

Ask the groups to keep the items they have on the floor, with a distance of about one metre separating the two items, like this:

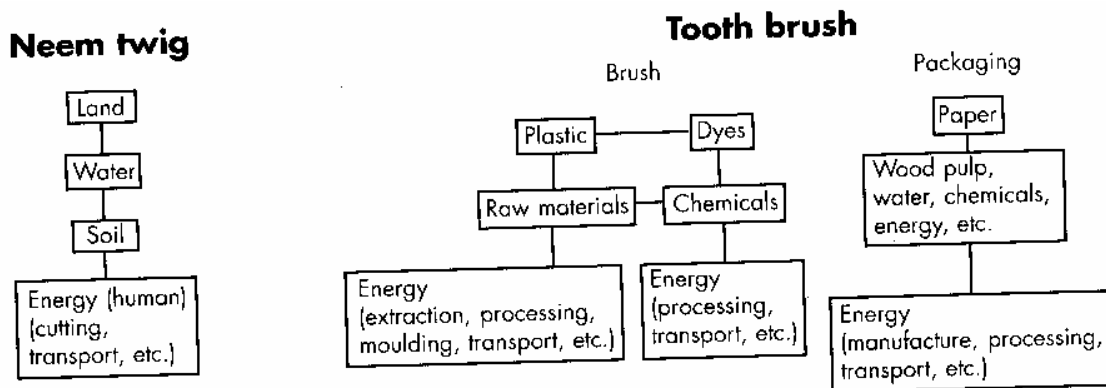


The task for each group is to make two separate ‘tails’ for the two items with the cards/paper pieces or with the chalk on the floor.



The tails have to show all the resources that were used in getting the product to them. Each resource has to be written on a separate card. The cards have to be linked to each other and to the item. They can be linked with pins or with thread. If the exercise is done on the floor, the name of each of the resources can be written on the floor with chalk and linked with lines drawn with a different coloured chalk.

For example, in the pair ‘Neem Twig’ and ‘Tooth Brush’, the tail would include the following:



After 20 minutes, ask each group to take turns and present their findings to the other groups.

The groups should highlight:

What do the tails indicate?

Which of the two tails is larger, complex and why?

The other groups can add new ideas and insights to the findings.

Discussion

What pointers for action does this activity give us?

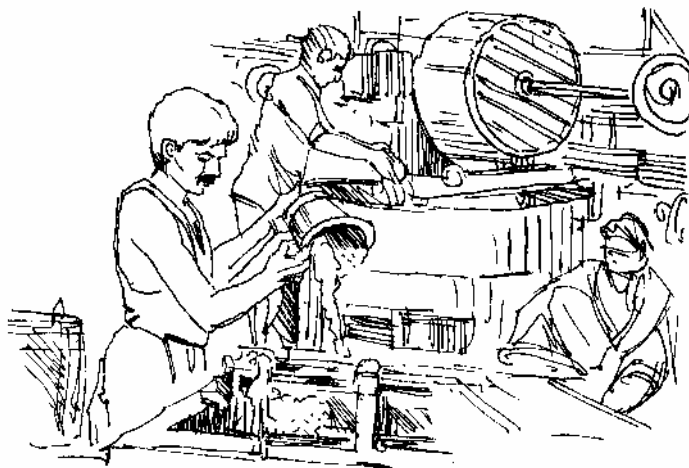
Every product impacts the environment throughout its life—during its manufacture, use and after its disposal. Some products have a much larger impact than other products. For example, the impact of a tooth brush on the environment will be much more than the impact of a neem twig brush (as the activity will illustrate).

Sometimes it may be possible for us to make choices from between two products which serve a similar purpose. For example, a canned soft drink may be less desirable when compared to a bottled soft drink on environmental grounds. After the soft drink is consumed, the bottle can be returned to be reused, but the can will have to be recycled—a process which will consume more energy.

The activity will help in the realization that we should be selective in our consumption where possible. We need to think of the impact that the products we choose have on the environment and choose those which will result in the least environmental damage in their extraction, use and disposal.

Variation

The participants can be asked to include the resources used during the use of an item (for example, the use of a toothbrush will require tooth paste, water, etc.), and its impact when it is discarded after its use (a plastic tooth brush will be in a garbage dump for years).



Hidden Treasure

Before We Begin

Biodiversity, or the biological diversity of life, refers to the biosphere's genetic material contained within the rich variety of life forms with which we share this planet.

Biodiversity is important for the continued well-being of the earth and its inhabitants. The greater the number of existing species, the more resilient the biosphere and its ecosystems. Greater diversity also means greater possibilities for selection of natural resources.

Biodiversity forms the basis of all our essential products (e.g., food, many medicines, fabrics). There is a vast potential for developing new sources of food, medicine and other essentials, and improving existing sources by tapping the earth's biodiversity.

Biodiversity is rapidly declining due to human activities (e.g., deforestation, improper agricultural practices) and the consequences of human activities (e.g., pollution).

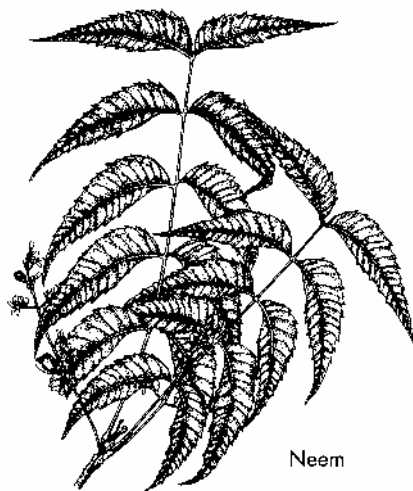
India has a diversity of environments ranging from deserts to monsoon forests to alpine meadows, all characterized by specific flora and fauna. It is estimated that about 4 to 5 per cent of all known plant and animal species on earth are found in India.

Spotlight

What's in a Neem?

Neem is native to Burma and the arid regions of the Indian subcontinent. Its botanical name,

Azadirachta indica (derived from the Farsi *azaddarakth in Hindi*), literally means 'the free tree of India'. Neem is an evergreen, fast-growing tree which can reach a height of 25 metres and can survive up to 200-300 years if not cut down. The tree thrives even in nutrient-poor dry soil. It tolerates high temperature, low rainfall, long spells of drought and salinity, but it does not do well in frost.



Neem

Not long ago, pregnant women in parts of South India would light a lamp of neem oil in their homes to purify the air of pollutants and drive away insects. After childbirth, they would bathe in water boiled with neem leaves, because of the immense medicinal and rejuvenating properties of the tree.

“Indians have used neem in practically every aspect of life—to store grains, to preserve books, to bathe children with chicken pox or measles, for ear infections, hair care, dental care, and so on,” says neem activist Pramila Thakkar.

“Every single part of the neem tree, from the roots to the bark, the leaves and the seed is extremely beneficial”, says Thakkar. “We had many traditional uses for the tree in India. But today, many of us have lost that knowledge.”

“Its formidable array of highly bioactive compounds makes neem a unique tree with potential applications in agriculture, public health and for regulating even human fertility”, writes Dr Saxena, in a paper on neem.

“The tree can usher in a new era in pest control, provide millions with inexpensive medicines, cut down the rate of human population growth and reduce erosion, deforestation and the excessive temperature of an overheated globe”, states a 1992 report of the National Research Council.

The neem population in India today is about 20 million. That is, one neem for every 50 Indians. (Source: “What’s in a Neem?”. *Deccan Herald (Bangalore)* 12.04.98).

Activity - Hidden Treasure

Thrust Area	Biodiversity
Group Size	About 10
Time	30 minutes
Materials	Note books/papers and pencils for each participant, Hidden Treasure cards (see below).

Objective

To help students become aware that information on the uses of biodiversity is largely unknown, unexplored and incomplete.

Preparation

Hidden Treasure Cards:

Cut 10 slips of paper of the size 15 cms x 15 cms. On one side of the paper, write the scientific names of the plants. On the other side of the card write the common name along with the ‘hidden treasure’ information.

Card 1

Acacia arabica

Common name: Babul

Hidden treasure information: Branches and leaves are cut and used as food for cattle and goats. Wood is used for making farm tools and is also used for fuel and charcoal. The gum, which comes from the trunk and oozes out of damaged parts of the bark, is used for making glue and sweets. The thorns are used as pins. The twigs are used for cleaning teeth. Lac is also obtained from this tree.

Card 2

Moringa oleifera

Common name: Drumstick tree

Hidden treasure information: Roofs are used for making a spicy sauce eaten with meat. The leaves and flowers are rich in vitamins and are made into curries. The seeds are crushed to give oil which is used by watchmakers and for making perfume. Fruits are a popular vegetable.

Card 3

Erythrina indica

Common name: Indian Coral Tree



Indian Coral Tree

Hidden treasure information: Soft wood is used for making small boats and for carving ornaments. The new leaves are made into curries. A red dye is obtained from boiling the petals. The planting of these trees helps to nourish poor soils as the roots contain bacteria which can take in nitrogen from the air. This enriches the soil. The leaves are used for feeding cattle.

Card 4

Pongamia glabra

Common name: Pongam / Karanj

Hidden treasure information: Seeds produce oil which is useful for treating skin diseases, for burning in lamps and making soap.

Card 5

Lawsonia inermis

Common name: Henna, Mehndi

Hidden treasure information: Leaves yield a very important cosmetic dye used for colouring hands, feet, hair, etc. The leaves are also used for dyeing cotton fabrics. Both the leaves and the flowers are used in the manufacture of perfumed oils.

Card 6

Cinnamomum tomala

Common name: Tejpat

Hidden treasure information: Fragrant oil from the bark is used in the manufacture of soap. Leaves are highly scented and used as a spice and in the manufacture of vinegar. The leaves are also used in dyeing and in calico printing. The bark and leaves are used for tanning skins.

Card 7

Curcuma longa

Common name: Turmeric

Hidden treasure information: A yellow dye is extracted from the rhizome. It is used in dyeing carpets, hand-made paper, toys, leather, cotton, etc. It is a major ingredient in Indian cooking and is also used as a cosmetic and ant repellent, It is believed to have antiseptic properties.

Card 8

Vetivera zizanioides

Common name: Khus-khus

Hidden treasure information: Roots yield fragrant oil. This oil is used for fixing volatile oils and for perfuming soaps. The fibrous roots are made into mats, fans, etc.

Card 9

Achros zapata

Common name: Chickoo

Hidden treasure information: The fruit is eaten. The latex is used in the manufacture of chewing gum, as a cement for joining small articles and in dental surgery.

Card 10

Cannabis sativa

Common name: Charas, Ganja, Bhang

Hidden treasure information: The resin is used as an intoxicant in three forms. The seed oil is used in the manufacture of paints, varnish and soaps. Fibre from the plant is used for making ropes, nets, tarpaulin, carpets, etc.

Procedure

Give one Hidden Treasure card to each participant. Ask them to read their card carefully and pin it on themselves in a way that only the scientific name can be seen by the other participants. They are not supposed to show the information side of their card to any other person.

Tell the participants that each of the cards has Hidden Treasure information on the plant whose scientific name is seen. The task for each participant is to find out as much information as they can about the uses of the plants represented by the other participants. They can do this by going around the room and asking the other participants questions about the plants. They can note down the information they gather from the other participants in their note books/papers.

The participants can answer each others' questions with either a YES or NO or I DON'T KNOW. No other answers are allowed.

Give the participants 15 minutes for this task.

At the end of this time ask the participants to stop. They should now all sit in a circle.

Ask each participant to say which three plants he/she would conserve if that was all that were possible. Ask each participant to also give the reasons behind the choices.

Write the scientific names of all the plants on the board and make a tally of how many participants 'vote' for the conservation of each of these plants.

There will be a few plants with no votes or with very few votes.

Ask each of the participants whose cards got no votes or got only a few votes to read out the hidden information from their hidden treasure cards one after the other. The common names of these plants must not be read out. Now ask the rest of the group if they would want to select the plant for conservation in the light of the new information. They may have to give up the plants they selected earlier for this. After this, ask the participants to guess which is the plant featured on the card. If the participants are not able to guess correctly, tell them the common name of the plant.

Proceed in a similar fashion with the other Hidden Treasure Cards. Instead of asking the card holder to read out the information on his/her card, you can first ask all the other participants to share the information they have collected about that particular Hidden Treasure. After all the participants have pooled in their information, ask the card holder to read out the Hidden Treasure information from his/her card and fill in the gaps.

Discussion

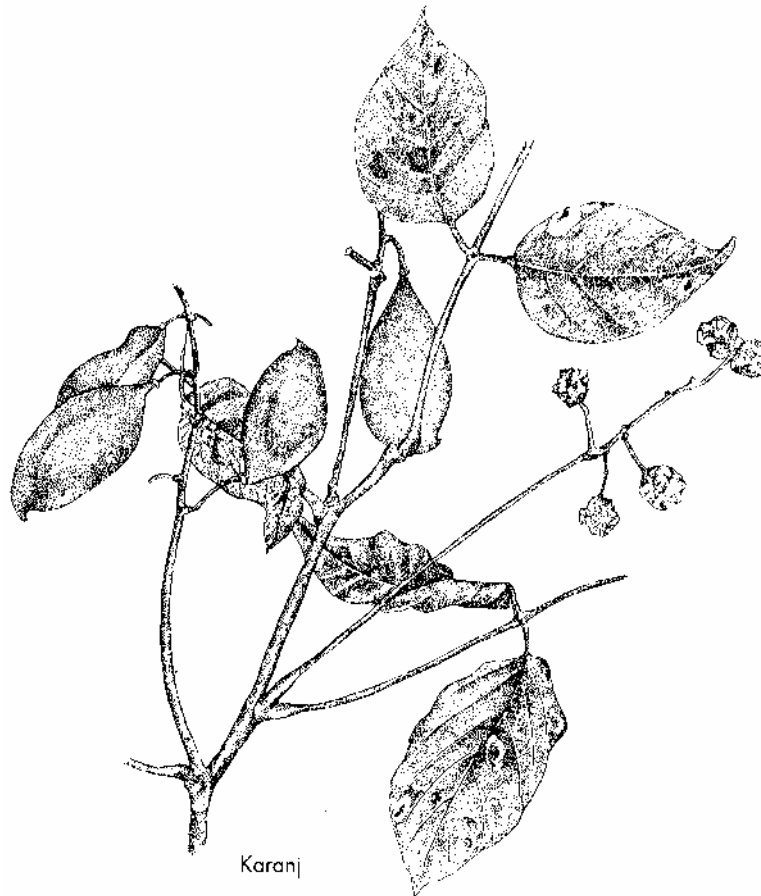
How is biodiversity useful?

Biodiversity is important for the health of our planet and of human society. It has aesthetic, economic, ethical, ecological and cultural value.

Some of the economic uses of plants and animals are their use in the manufacture of foods, fibres, medicines, gums, oils, resins, dyes, tannins, vegetable fats, waxes, insecticides, starch and detergents. Plant products are also used as building materials.

Each animal and plant has an ecological value. It has a specific role to play in maintaining the health of the whole ecosystem.

Many species are of specific cultural significance. For example, turmeric is considered auspicious by many people in India. *Tulsi* is considered sacred.



Are these uses always obvious?

At present, our information on biodiversity is limited. We do not even know how many species exist on the earth. Estimates on the number of species of plants and animals on earth vary significantly. The most widely accepted estimate is about 10 million, but there may be as many as 30 million. Only about 1.8 million of these species have been identified so far. While a number of uses for different species of plants and animals have been discovered, there are many more which may be potentially useful, but are at present

unknown. It is only after extensive research that these species can be identified and their potential uses revealed and applied.

Why is it important to protect biodiversity?

Biodiversity has much value—some of it is not yet understood. It also has many uses. It must therefore be conserved—that is, it should be managed in a way that it can be used rationally and sustainably as well as protected.

Variation

To illustrate how traditional community knowledge of the uses of different species may get eroded from generation to generation, you could try this 15-minute activity with a group of 7-10 participants:

Make the participants sit in a circle. Give one Hidden Treasure card to one participant and ask him/her to read it once to himself/herself. Now, take the card back. Ask the participant to pass on the information he/she knows about the hidden treasure to the **next** participant by whispering it in his/her ear. Ask the second participant to pass it on to the third participant and so on, till the information gets to the last participant in the circle. Now, ask the participant who was the last one to receive information to share what he/she heard. Compare this with the information on the Hidden Treasure card by reading it aloud. Note the gaps and the possible changes in the information. Discuss with the participants how traditional knowledge on uses of biodiversity may be lost or distorted as it is handed down from generation to generation and discuss the importance of documenting traditional knowledge to reduce such loss.



Guess Who Is Threatened?

Before We Begin

Biodiversity, or the biological diversity of life, refers to the range of life forms on earth. These include millions of plants, animals and micro-organisms, the genes they contain, and the intricate ecosystems of which they are a part.

Loss of biodiversity takes place when unique habitats or ecosystems are reduced or degraded, and when species become extinct in the wild. Some famous examples of Indian animal species that have become extinct are the Cheetah and the Pink-headed Duck. The Forest Owlet is also known to have disappeared. At least 20 higher plants are also known to have become extinct in India.

There are manifold causes for the loss of biodiversity. Among these are the rapid growth of industry; the intensification and expansion of agriculture; urbanization; large scale development projects like mining, dams, and highways; and other human activities. These activities have led to the destruction of habitats, pollution and overutilization of biological resources, which have resulted in the rapid erosion of India's biodiversity.

Poaching and illegal trade of wildlife products have also severely threatened many wild species.

Spotlight

A Safety Belt under Siege

A totally rusted notice board outside the village of Nagayalanka, which lies 80 km from Vijayawada, says it all. "Welcome to Krishna Wildlife Sanctuary, the habitat of lovely mangrove forests," it says.

The decrepit signboard typifies all that is wrong with this wildlife sanctuary perched picturesquely on the estuary of the Krishna river. The sanctuary harbours unique mangrove vegetation and is home to salt water crocodiles, fishing cats and otters, besides endangered animal species like dolphins and dugongs (sea cows).

But now most of this mangrove sanctuary is degraded, with vast stretches of forest land having been converted into fish or prawn ponds. Cattle can be spotted all over, freely grazing in the area and denuding the sanctuary further. Hardly 10 per cent of the 200 sq km sanctuary now has any greenery worth the name. The rest has been rendered into barren, sandy patches.

Rues a senior forest official, "The mangrove vegetation was so thick a couple of years ago that we used to auction the wood every alternate year. But today we do not even find enough seedlings to take up the regeneration programme".



Besides, though it is a notified wildlife sanctuary, it has no security worth the name and poaching is known to be quite rampant in the area. The degradation started soon after a major portion of the vegetation was washed away in the tidal wave that swept the south Andhra coast in November 1977. What certainly added to the problem was the unchecked poaching that went on. All the hue and cry by environmentalists to save the mangroves from extinction fell on deaf ears. One can still find people carrying away logs of wood for firewood after having felled the mangrove shrubs.

By the time the Government did start listening to ecologists, much of the damage had been done. Finally, in 1992, the entire estuary of Krishna was declared a wildlife sanctuary to protect the mangroves. Six years later, the notification doesn't seem to have made a difference. Even the nursery set up by the government to take up artificial afforestation of mangroves failed this year.

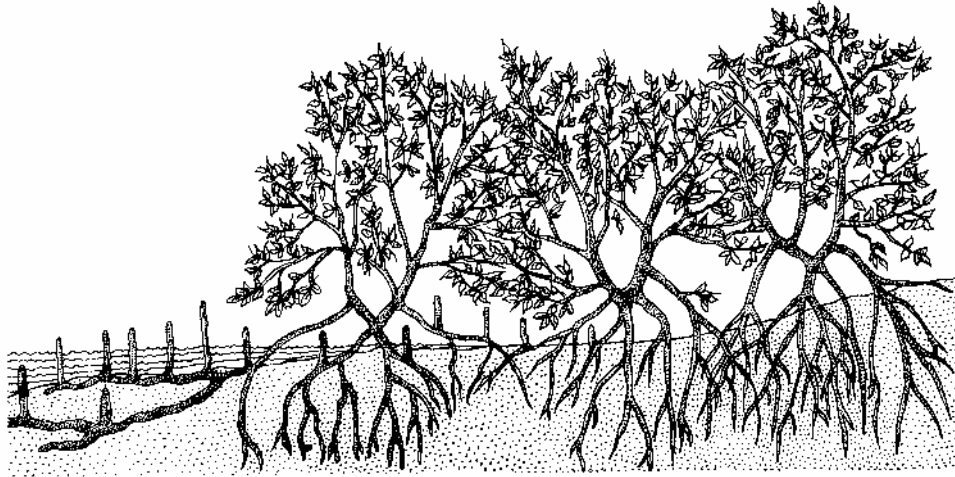
However, even as the sanctuary continues to suffer for want of protection, plans are afoot to denotify as much as three hectares of the mangrove forest in Machilipatnam to set up a fishing harbour. The Central Government had earlier denotified thousands of hectares of mangrove-rich reserve forest lands near Machilipatnam and Nizampatnam.

If these mangroves go, so will the thousands of life forms which thrive in forests known to have high salinity fluctuations. The wildlife here includes insects, molluscs, fish, some mammals, amphibians, reptiles and microscopic plankton. Birds like pond herons, reef herons, sand pipers, flamingos, sea gulls, little egrets, pied kingfishers and about a hundred other species nest in these mangroves. They also contain about two dozen families and 70 species of plants. Felling the mangroves will deprive the birds and animals that have lived here over the centuries of their habitat and might even lead to their extinction.

Environmental activists have suggested that as most of the villagers who violate the Wildlife Act are from the poor sections of society, the Government should introduce welfare measures to reduce the dependence of people living in and around the mangrove sanctuaries on the forests.

If mangrove trees are felled recklessly, it is the people living along the coast who will suffer the most. The mangroves protect the coastline from erosion and help reclaim land from the sea. They also act as shelter belts and protect inland coastal villages from tidal waves, besides guarding against cyclones.

[Source: Syed Akbar. "Safety Belt Under Siege". *Indian Express* (New Delhi), 25.10.98).



Activity - Guess Who Is Threatened?

Thrust Area	Biodiversity
Group Size	Up to 30
Time	30 minutes
Materials	Blackboard, chalk, Threatened Species' cards (see below)

Objective

To help participants become aware of the threats to biodiversity.

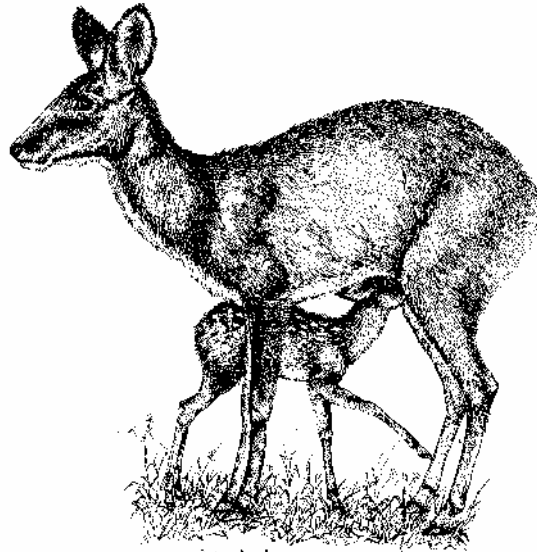
Preparation

Threatened species cards: For making the threatened species cards you will need old visiting cards or paper cut to the size of ordinary visiting cards. On one side of each card/paper write the following information on the threats faced by different species (use one card for one species):

Elephant: Faces threat due to poaching for ivory and decrease in forest area due to conversion of forest lands into plantations.

Tiger: Faces threat due to poaching for bones, body parts, etc., which are used in traditional medicine in far-Eastern countries. Also faces threat due to loss of habitat

Musk deer: Faces threat due to poaching for 'musk' which is used in making perfumes.



Musk deer

Sandalwood tree: Faces threat from demand for its fragrant wood.

Lion {Asiatic}: Faces threat because the entire population of the species exists in only one forest—the Gir forest of Gujarat.

A single epidemic or any other disaster may wipe out the entire species. Musk deer

Great One-horned Rhino: Deforestation, habitat destruction, intrusion into their grazing grounds by cattle and poaching for their horns are the major threats that Rhinos face.

Blackbuck: Hunting for sport, flesh and skin, and habitat destruction are major threats to the blackbuck.

Turtles: Face threat from egg collection, killing for turtle meat, demand for their shells for decorative purposes and pollution of the coastal areas and the seas.

Wolf: Faces danger from hunting because of the common notion that they lift children.

Indian Rock Python: Poaching for illegal trade of its skin is a major threat to this snake.

Siberian Crane: Irregular monsoons and droughts in its wintering site in India threaten this bird.

Marsh Crocodile: Faces threat from loss of habitat on account of floods and droughts, hunting for hide, consumption of eggs, etc.

Procedure

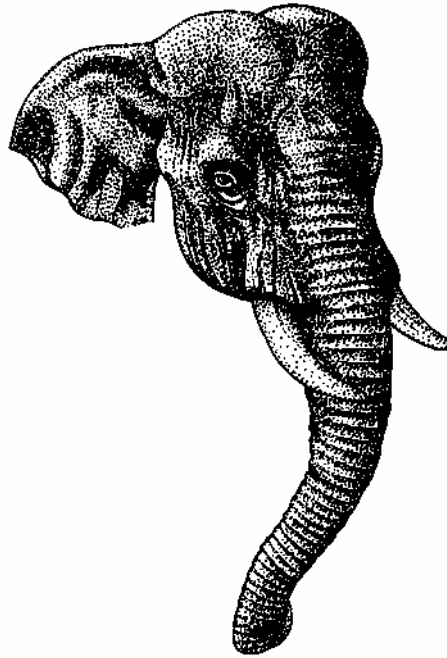
Write the names of the animals given in the threatened species cards on the blackboard (write only the names, and not the information on the threats).

Ask for a volunteer from the participants. Give a threatened species card to the volunteer. Ask the volunteer to read the card to himself/herself and keep it with her/him in a way that others will not be able to see what is written on the card.

Tell the participants that the volunteer represents one of the threatened species of plant/animals whose names are written on the blackboard. The task for them is to guess

which the threatened species is. They can ask the volunteers questions about the threats that face her/him. Questions not pertaining to threats should not be asked, except for the first question: 'Are you an animal?' (see examples below). The volunteer will answer the questions with only a YES or a NO.

The maximum numbers of questions that can be asked are seven. As the game progresses reduce the number of questions that can be asked to five. If the participants are not able to guess correctly even after asking their allotted number of questions, the volunteer can give them a clue, and two extra chances to make a guess.



Examples for 'Elephant'

Q: Are you an animal?

A: Yes.

Q: Are you killed for your meat?

A: No.

Q: Is disappearance of forests a threat to you?

A: Yes.

Q: Is poaching a threat to you?

A: Yes.

Q: Are you killed for your fur?

A: No.

Q: Are you killed for ivory?

A: Yes!

Q: You are an elephant!

A: Yes!

For 'Sandalwood Tree'

Q: Are you an animal?

A: No.

Q: Are you threatened because your habitat is getting lost?

A: Yes.



Q: Are you cut down for your wood?

A: Yes.

Q: Are you a teak tree?

A: No.

Q: Do you have medicinal value?

A: Yes.

Q: You are a sandalwood tree!

A: Yes!

Discussion

What are the kinds of threats to biodiversity?

Threats to biodiversity include habitat destruction, over-harvesting, pollution and the introduction of foreign plants and animals. Destruction of habitats such as forests, wetlands, grasslands, etc., is a major threat to biodiversity. Overexploitation of

biodiversity is another area of grave concern. For example, if medicinal plants are collected beyond a point from which they can recover, the species are gravely threatened. Pollution of habitats is an increasing threat. A well known example of this is the accumulation of DDT across the levels of the food chain, gravely affecting species at the higher end of the food chain. Introduction of foreign species is also a significant threat. Exotic species of plants and animals compete with local species for food, space, etc. As they may not have any natural predators in the area in which they are introduced their numbers multiply rapidly, threatening local species.

What is being done in India to safeguard biodiversity?

India has a long history of *in-situ* conservation that is conservation in the natural habitat. Wild species of animals and plants are conserved by establishing protected areas throughout the country. India has a protected area network covering 4.1 per cent of the total land area.. There are 421 sanctuaries and 75 national parks which shelter varied and representative ecosystems. India has five natural world heritage sites and six wetlands of international importance. Other conservation initiatives include biosphere reserves, marine reserves, gene conservation centres, and the preservation of wetlands, coral reefs and other natural habitats. Project Tiger, the largest conservation effort by the Government, succeeded in increasing the tiger population from 268 in 9 reserves in 1972 to 1,121 in 21 reserves in 1995. Similar schemes are being undertaken for the elephant, crocodile, barasingha and lion-tailed macaque.

The *ex-situ* conservation of plants and animals (that is, preserving them away from their natural habitat) is being carried out in several kinds of institutions such as zoological parks, botanical gardens, forestry institutions and agricultural research centres.

India has several Acts in force which have a bearing on the conservation of biodiversity. Some of these Acts are:

Environment Protection Act, 1986; Fisheries Act, 1986; Forest Act, 1927; Forest (Conservation) Act, 1980; Wildlife (Protection) Act, 1972 and Wildlife (Protection) Amendment Act, 1991.

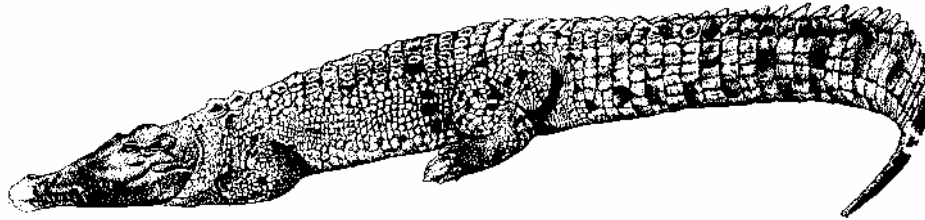
Conservation has been an integral part of Indian history and tradition. For example, religious tenets support the preservation of biodiversity through institutions like sacred groves.

There are a number of NGOs in the country ranging from national agencies to local groups; from research organizations to field organizations. Many of these are involved in biodiversity conservation through activities such as eco-development, forest conservation, eco-friendly technologies in industry and agriculture, etc.

Actions needed to conserve and maintain biodiversity include:

- Assessing the state of biodiversity
- Developing a strategy to conserve and sustainably use biodiversity
- Conducting long-term research into the importance of biodiversity
- Encouraging traditional methods of agriculture, agro-forestry, forestry and wildlife management which conserve biodiversity
- Creating awareness about the importance of conserving biodiversity
- Involving communities in conserving and managing biodiversity

- Implementing fair and equitable sharing of benefits from the use of biodiversity
- Protecting natural habitats
- Promoting rehabilitation of damaged ecosystems, and the recovery of threatened and endangered species.



Reaping What You Sow

Before We Begin

Agriculture in India has traditionally been labour intensive and ecologically sustainable.

With time, the use of modern technologies and practices (e.g., submersible pumps, use of hybrid seeds, chemical fertilizers, pesticides) in agriculture is increasing.

The demands of new agricultural technology have led to the over-exploitation of groundwater leading to a drop in water tables and extreme salinity. The excessive use of chemical fertilizers and pesticides has polluted surface water and ground water. Water and wind erosion, degradation through water logging, salinity, desertification, etc. are some of the undesirable outcomes of modern agriculture.

The declining human-land ratio and the increasing competing demand for land has led to arable land being diverted for non-agricultural purposes, leading to a loss in productivity.

Appropriate agricultural practices can contribute to mitigating these problems. For example, productivity of agricultural land can be improved through techniques such as inter-cropping (planting a combination of crops which require different nutrients); crop rotation (planting, in succession, crops which use nitrogen from the soil and those which replace it); agro-forestry (planting trees and shrubs amongst crops, leading to the utilization of nutrients deeper in the soil which are not available to shallow-rooted crops). Regenerative farming requires less chemical fertilizers and pesticides to produce the same yields. However, these methods may be labour intensive.

Spotlight

Darjeeling Tea Planters Adopt Organic Farming

Organic farming in tea, especially in the Darjeeling gardens, is fast gaining ground.

Apart from clinching better export deals in the European market, organic farming has helped in the retention of top soil and kept it alive with micro-organisms, planters who have adopted organic farming practices say.

The use of such practices is on the rise as export markets like Germany are becoming more stringent on the quality of premium teas.



With exports of organic tea on the rise, most growers are contemplating a shift to organic cultivation. As many as 11 gardens in Darjeeling have gone fully organic. Organic farming practices wholly depend on use of natural fertilizers and insecticides. Says a planter, “It is essential to take a long-term view of the crop and soil, which if nurtured properly will increase yields and also fetch better prices.”

Most organic planters observed that the productivity has been on an increase in tea estates that have gone for organic cultivation. The total production of organic tea in India sums up to roughly 1.5 million kgs. Although this happens to be a very small portion of the overall production, the fact that many gardens are switching over to organic farming is an interesting indicator.

The organic farming practices in the Darjeeling Tea Estates include the use of citronella or lemon grass as a boundary wall for a garden. Lopping off the aromatic grass emanates a lemon-like smell which prevents insects from entering the gardens. A Darjeeling planter says that *banmara*, a local grass serves as an ideal natural fertilizer. Stinging nettle or sisum is another valuable fertilizer as it is a source of nitrogen. It also has insecticidal properties. Another interesting practice is the use of *Guatemala and amtiso* (the common broomstick plant) for naturally binding soil. The organic Darjeeling gardens have also found a way to counter problems to the tea plants due to fog: the extract of a plant named *Equisetum arvense*, better known as horse tail, is sprayed to counter these problems.

[Source: Goswami, N. “Darjeeling Tea Planters Adapt Organic Farming”. *Financial Express (New Delhi)*, 27.04.98].

Activity - Reaping What You Sow

Thrust Area	Sustainable Agriculture
Group Size	About 25
Time	30 minutes
Materials	One farmer's card (see below) for each of the groups, papers and pencils, data sheets [see below] for each group or data displayed in a way that all groups can see it easily from where they sit.

Objective

To help participants understand the factors influencing choices made by farmers, which have a bearing on the sustainability of agriculture?

Preparation

For this activity you will need the following materials:

Farmer's cards: Cut a piece of chart paper into five cards. The dimensions of each card should be approximately 10 cms x 15 cms. Write the following paragraphs, one on each card:

Farmer 1: You are a poor farmer with one hectare of land. Agriculture on this land is your only source of income. You do not own any livestock. You live in a dry area and are totally dependent on the rains for agriculture. There are six members in your family.

Farmer 2: You are a poor farmer with one hectare of land. You also own two cows and four goats. Produce from the land and the livestock is your only source of income. You live on the plains close to a perennial river which is the main source of water for irrigation. There are two members in your family,

Farmer 3: You are a middle class farmer with two hectares of land. You also own three cows. The produce from the land and from the livestock are the main sources of your income. You live in an arid area where the availability of water for irrigation and fodder for cattle is a perennial problem. There are eight members in your family.

Farmer 4: You are a middle class farmer with three hectares of land and four goats. You also have a small business. Both agriculture and business contribute to your income. You live in a fertile, well irrigated area. There are six members in your family.

Farmer 5: You are a rich farmer with six hectares of land. You do not own any livestock. You have a profitable business in a nearby town. The business is the major source of your income, while agriculture is a secondary source. Your fields are irrigated by water from a canal close by. There are five members in your family.

Data sheet: Write the following data on the blank side of each farmer card or on a large sheet of paper and display it at a place where all participants can see it from where they sit.

Data sheet

	Seed varieties	
	<i>Alpha</i>	<i>Beta</i>
Yield (kg/hectare)	3300	4700
Water Demand	12 units	36 units
Fertilizer requirement	50 units	90 units
Pesticide requirement	30 units	20 units
Grain: Straw ratio*	1:6	1:1

(* Grain: Straw ratio is the ratio of the amount of grain produced to the amount of straw produced. The ratio 1:6 means that for every one unit of grain that is produced, 6 units of straw is produced. The ratio 1:1 means that for every one unit of grain that is produced, one unit of straw is produced. Straw is used for feeding livestock.)

Procedure

Divide the participants into five groups of about 5-7 people each. Give each of the five groups a different farmer's card.

Tell them that they are farmers who have to make a decision on the kind of seeds that they will sow. Display the data for all the groups to see.

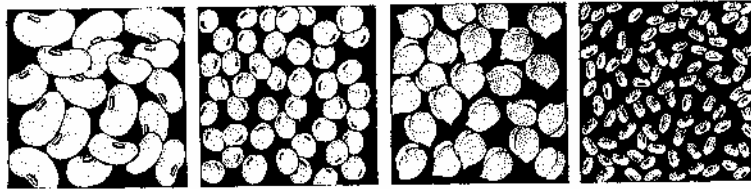
Tell them that as farmers they need to keep the following in mind while making their decisions:

- Yield of the crop: Their choice will depend on: the number of members in their families, whether they would like to market their produce, if agriculture is the only source of their income, etc.
- Water, fertilizer and pesticide demand: All of these will require investments to be made.
- Straw production: Their choice will depend on the number of livestock they possess and their ability to buy animal feed if required.
- Sustainability: Their choice will depend on if they can continue with farming in the same manner in the future. For example, if they choose a variety which needs more water than is naturally available in the area, irrigation may be required. Irrigating an arid area may cause the soil to become saline over a period of time and become unproductive.

They have 15 minutes to make the decision and to list down the reasons for taking the decision.

At the end of Fifteen minutes, ask each group to present their decisions and the reasons behind the decisions. The reasons should not be just the data already given for the seed varieties, but will need to expand on this. For example, a statement which says 'We choose the Alpha variety because it requires 50 units of fertilizer is not valid. The groups

have to say something like ‘We choose the Alpha variety because it requires 50 units of fertilizer. We feel we cannot afford to buy the 90 units of fertilizer that the Beta variety requires.’



Discussion

What factors governed your decision regarding the kinds of seeds you will sow?

For each group of farmers, the factors which govern their decisions may vary. While the yield of the crop variety may be a common consideration, other factors which influence the decision will be the investments the crop demands, the amount of straw it produces for feeding livestock, the water it consumes, the amount of chemical fertilizers and pesticides it needs, etc.

What are the kinds of seeds available to farmers today?

Both traditional varieties of seeds and commercial varieties of seeds are available to farmers today. Commercial varieties are hybrids usually marketed by corporates, government bodies, etc. Traditional varieties are generally maintained by individual farmers.

What governs farmers' decision of which seed to sow?

Farmers consider a number of factors while taking decisions regarding which seeds to sow. Some of the factors may be the yield of the crop variety (both the seed and the straw), its resistance to pests and disease, its ability to survive in harsh climate, soil and water conditions, the cost of the seed, the investment it requires in term of irrigation, fertilizer, etc. Another important factor is the information that farmers have about the crop variety.

Does the choice of seed influence agricultural practices?

The type of seeds has a significant influence on agricultural practices. Modern varieties focus largely on yield and disease resistance. They often compromise on other important features of the crop like ability to yield fodder, adaptation to harsh climatic conditions, etc. Traditional and natural varieties of crops usually place equal importance on the ‘wholeness’ of the crop. The emphasis is not only on crop yield. For instance, high yielding rice typically produces a one to one ratio of grain to straw. Traditional varieties of rice produce four to five times as much straw as grain. Thus a shift to high yielding varieties from traditional varieties increases the grain available but decreases the straw. The scarcity of straw leads to a scarcity in fodder for cattle. Modern seed varieties also need much more water and fertilizer than indigenous varieties. High yielding varieties of wheat for example need three times as much irrigation as traditional varieties.

Does the choice of seed influence the sustainability of agriculture?

Seeds—both modern and traditional, have specific characteristics and requirements. Some varieties of seeds demand more inputs such as water, fertilizers and pesticides. These demands may impact the sustainability of agriculture. For example, excessive irrigation to meet the demands of high-yielding varieties of seeds has led to salinization of soils in parts of India, affecting their productivity. Fertilizers and pesticides may find their way into local water bodies through runoff, causing pollution.



Holiday Time

Before We Begin

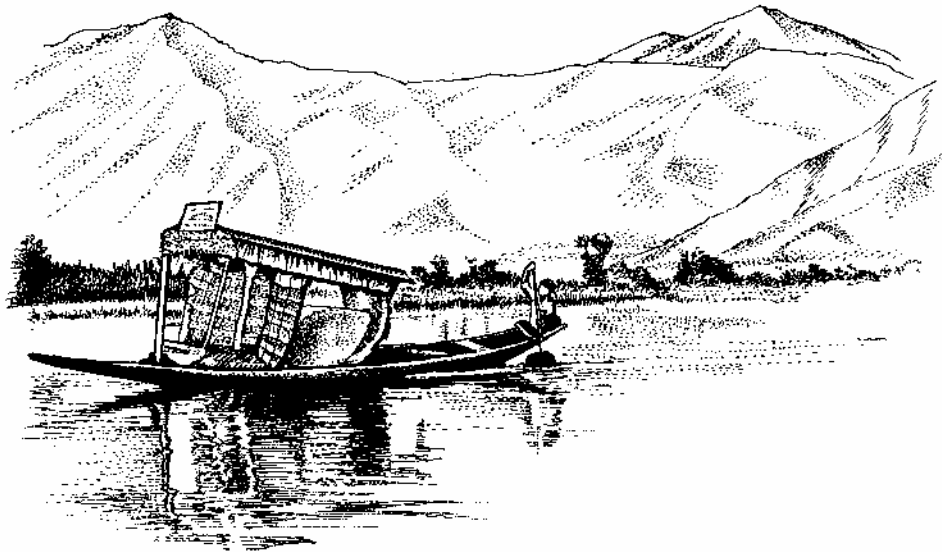
Tourism is one of the largest industries in the world. It impacts both people and the environment in several ways.

Sustainable Tourism is: “tourism and associated infrastructures that, both now and in the future: operate within natural capacities for the regeneration and future productivity of natural resources; recognize the contribution that people and communities, customs and lifestyles, make to the tourism experience; accept that these people must have an equitable share in the economic benefits of tourism; are guided by the wishes of local people and communities in the host areas.” (*Tourism Concern*)

Sustainable tourism requires a variety of initiatives that regulate tourist interaction. For example, tourists may be allowed to enter only certain areas in a national park and in certain seasons. Sustainable tourism seeks to minimize the negative impact that tourism can have on the environment. For example, regulations in certain countries require trekkers to carry back their garbage with them. Sustainable tourism also tries to maximize the positive impact that tourism can have. For example, at some national parks, local people are trained and employed as guides. Tourism provides them an income. At other places, the income received from tourism is used for environmental conservation activities. Sustainable tourism also educates the visitor about the nature /cultural heritage of the place and encourages the tourist to contribute to its conservation.

Ecotourism is “low impact nature tourism which contributes to the maintenance of species and habitats either directly through a contribution to conservation and/or indirectly by providing revenue to the local community sufficient for local people to

value, and therefore protect, their wildlife heritage area as a source of income.” (Goodwin 1996)



Tourism: A Balance Sheet

Factor: Economic

Good things tourism can bring:

- Income, jobs, investments, infrastructure, communications, trade and commerce, international recognition and good-will

Bad things tourism can bring:

- Economic uncertainty due to rapidly changing market conditions and demands, often beyond me control of the supplier
- Accelerated, uncontrolled economic transformation
- Higher costs of living
- Crowding-out of local activities, land-use and resource-use rights
- Increased dependence on the outside world

Factor: Cultural

Good things tourism can bring:

- New perspectives, cultural influences and exchanges
- Conservation and restoration of heritage sites and monuments

Bad things tourism can bring:

- Loss of cultural diversity
- Loss of traditional knowledge

- Degradation, loss and illegal trade in historical artefacts

Factor: Social

Good things tourism can bring:

• Knowledge, information, contacts, reduced isolation, new languages
Bad things tourism can bring:

- Increased social injustice (larger income differences)
- Unsound consumption and lifestyle patterns
- Loss of self-esteem [low-paid service jobs]
- Criminality, insecurity
- Diseases
- Stress and higher tempo
- ‘Seasonal Society’

Factor: Environmental

Good things tourism can bring:

- Environmental awareness
- Environmental investments

Bad things tourism can bring:

- Environmental degradation, litter and pollution
- Eutrophication of water bodies
- Introduction of alien species
- Illegal trade in endangered species
- Loss of biodiversity
- Loss of landscapes and scenic beauty
- Congestion
- Noise

Spotlight

Abundant Scope for Ecotourism in Matheran

Ecotourism is what Matheran needs to promote. With its splendid walks and riding trails and rich flora and fauna, this unique hill station could easily be an exciting eco-expedition for its visitors. But this is precisely what its all-powerful hoteliers are allergic to—much to the chagrin of its naturalists, heritage lovers and ordinary people alike.

The big time hoteliers in the resort would rather construct hotel complexes complete with swimming pools and health clubs than establish resorts that provide eco-friendly pass-times.

“Granted, making profits is the bottom-line, but surely they can make as much money from promoting eco-tourism?” ask Bombay Natural History Society (BNHS) activists who trek regularly in the Matheran woods.

“Worse, why is the government encouraging such hotels in a green zone—and one that holds some of the region’s loveliest natural treasures at that?” ask Samir Mehta of the Bombay Environmental Action Group and Isaac Kehminkar of the BNHS.

Matheran is a rich storehouse of mammals, reptiles and birds—some of which are heading towards extinction, the environmentalists point out. Panthers, wolves and hyenas may not be easily sighted nowadays, but locals insist that a few still exist in the forests on the Matheran plateau. As do the giant squirrels which are an endangered species, adds Kehminkar.

There are some wonderful birds too, according to Kehminkar: peafowl, swallows, shamas, shahin falcons, crested tree swifts, sky larks, green pigeons, crimson-throated barbets, orange-bellied ground thrushes, kestrels; and reptiles such as the monitor lizard, green pit viper, skink, rat snake, cobra, python, and vine snake.

In addition, Matheran has a variety of medicinal plants: *karambel*, *karvi*, *kalalavi*, *kashimb*, *khair*, *parjambul*, *dukkar-kand*, *ran-wangi*, *ran-bhendi* and *gulvel*. Some of these endangered species have to be carefully nurtured, note Kehminkar and Rohan Bhansali, a Mumbai-based ayurveda practitioner. “It is vital for the government to protect these forests”.

“Instead, the authorities want to destroy this place”, laments Arvind Shinde, a local shopkeeper who was born in Matheran. “They are only too willing to demolish the shanties of the poor who have come here to eke out a livelihood, but they are utterly loath to stop the rich hoteliers who are playing havoc with the ecology of our hill station!”

There is a water shortage in these hills specially during the summer, points out political activist Raghunath Kadam. “But big hoteliers are hell bent on sinking more and more swimming pools in Matheran. Not only are they excavating mud and stone to sink these pools, but they are also using up huge amounts of water. When we protest, they claim that they only fill up their pools once a year! But what about the evaporation factor, and the ancillary use?” he observes.

Adds H.R. Biramme, another old time shopkeeper/The government sanctions swimming pools in big hotels overnight, but it takes years to provide us poor people with water.”

Several petty businessmen assert that the rich hoteliers are eating into their livelihood. “For instance, the big hotels, which have sprung up in recent times, provide everything from toothbrushes and toothpaste to snacks and soft drinks,” they explain, “So people don’t pick up these things from our little shops anymore.”



The need of the hour, according to Matheran's ordinary people, is for the government to stop any more big hotels from coming up here and to lay down a policy to promote eco-tourism and sustainable development in this hill station lying just 100 km away from Mumbai. "The state must put the needs of the people and the environment before the interests of the builders and developers", they insist. "It must stop being a mercenary vandal and start being a responsible custodian of our collective heritage, as it were."

[Source: "Abundant Scope for Ecotourism in Matheran". *Times of India (Mumbai)*, 20.04.98].

Activity - Holiday Time

Thrust Area	Sustainable Tourism
Group Size	Up to 30
Time	45 minutes
Materials	Tourism Development Cards (see below)

Objective

To become aware of the impacts of tourism and to facilitate thinking on how environmental and social concerns can be integrated into tourism management.

Preparation

For this activity you will require to make Tourism Development Cards'. For making the cards, cut a sheet of chart paper into four cards, each of the size 15 cms x 20 cms and write the following paragraphs, one on each card.

Tourism Development Cards

Beach tourism authority: You look after tourism development on a 50 km stretch of beach. The beach is close to a major city and has hundreds of visitors coming every day. Animal rides, hawkers selling food stuffs, shells, balloons, etc., are common along the beach. People also throw garbage at various places along the beach. The beach was once a good nesting site for sea turtles, which came there at a particular time each year to lay their eggs. In fact, the beach became popular as a tourist destination because of the turtles. But the number of turtles coming to the beach is reducing each year. The numbers of visitors on the beach, the noise they make, the lights of the restaurants built close to the beach, etc., are believed to be the main reasons behind this.

Mountain tourism authority: You look after the tourism affairs concerning a stretch of high mountains. The mountains are an attraction for international trekkers. Most of the trekkers carry a lot of disposable products along with them on the trek. These include plastic water bottles, glasses, etc. In addition to the trash created because of these products, there is also trash such as biscuit wrappers. Most of the trekking groups employ local youth as loaders to carry luggage and as guides on the trek. The amount of money the local youth get for their services depends on the nature of the trekking party. Some trekking parties pay well, while some others do not.

Forest tourism authority: You look after the tourism affairs of a forest sanctuary. The forest is frequented by tourists who come there to catch a glimpse of wildlife. The tourists are allowed to go around the sanctuary in jeeps and cars. The increase in tourist traffic with the accompanying noise of the vehicle horns, smoke, etc., disturbs the wildlife in the park. There are also instances of smaller animals being run over by careless drivers. There are a few tribal villages located inside the sanctuary. Visits to the tribal villages has recently become an attraction for foreign tourists. The tourists trade cigarettes, pens, T-shirts and other such objects for artefacts made by the tribal people.

Lake tourism authority: You look after the tourism affairs of a lake which has been declared as a sanctuary. The lake is visited by thousands of migratory birds each winter. Many tourists also visit the lake. Some of them come to see the birds, while for most others it is a popular picnic spot. Many visitors play loud music; play games, etc., at the lake. There are also reports that some tourists shoot birds for sport at the lake, though shooting has been declared illegal. People from the nearby villages take the tourists on boat rides into the lake. Some of them also act as nature guides helping tourists to identify the many species of birds at the lake.

Procedure

Divide the participants into four groups of about 5 to 7 people each. Give one tourism development card to each group. Ask the group to read their card and understand the situation in their area.

The task for the groups is to make a plan for tourism development in their respective areas. The plan has to ensure that both the natural environment of the area and the interests of the people (both visitors and the local communities) are safe guarded. The plan can include rules, regulations and a list of the facilities that they wish to provide in their areas both for tourists and for the local community. Give the groups 20 minutes to develop their plans.

After this time, ask each group to make a presentation of their plan to the whole group. The other groups can comment on the plans and suggest modifications in the plans.

Discussion

Does tourism affect the environment? In what ways?

The impact of tourism on the environment is significant. Tourism impacts both the natural and the social environment. The facilities that tourists require, the resources they consume and the waste they throw out impact the natural environment. The interaction of tourists with the local community impacts the social environment.

How can tourism be managed so that there are no negative impacts on the natural and the social environment?

Tourism can be managed in a way that will ensure that negative impacts on the local environment are minimized and positive impacts are maximized. Laws and regulations, if effectively implemented, can ensure that tourist interaction is regulated. For example, if laws prohibiting hunting, playing loud music, etc., are effectively implemented, threats to wildlife from tourists will be contained. If laws prohibiting defacement of heritage sites are effectively implemented, a major threat to historical monuments and heritage sites will be contained.

Education and awareness programmes to help tourists understand the significance of the natural environment and the need for its conservation are necessary. At the same time, the local community needs to be organized and equipped with information and skills, so that they can benefit from tourism. For example, at places such as the Keoladeo National Park in Bharatpur, Rajasthan local people have been trained as guides to help people identify and learn more about the birds there.

How can tourists ensure that their activities do not negatively affect the natural and social environment?

There are many actions that tourists as individuals can take to ensure that their travel and stay do not negatively affect the natural and social environment. These actions include:

- Preparing for the trip by learning about the natural environment of the location and about the culture, history and customs of the people.
- Travelling on foot, by bicycle or by public transport.
- Avoiding littering, making loud noises, disturbing natural habitats, collecting natural objects, defacing structures, etc.
- Avoiding going off the usual tourist paths as this could disturb the natural environment.
- Sticking to the rules.
- Respecting local customs and beliefs.
- Being fair in paying the local people for their services and goods.

Cross Country

Before We Begin

International trade contributes to economic development. But it can sometimes have undesirable effects on the environment. One example of this is the trade in toxic wastes.

Some 90 per cent of the world's hazardous waste is generated by the market economies of the OECD (Organization for Economic Co-operation and Development including countries such as Australia, Canada, Japan, the USA and the European Union).

Some of these hazardous waste products may be expensive to dispose of or recycle. Exporting this hazardous waste to less developed countries has been one way in which the industrialized world has avoided dealing with the problem of expensive waste-disposal and cause public scrutiny at home. For example, in 1996 alone, Australia exported over 8500 tonnes of hazardous waste to Asia, including scrap lead batteries, toxic zinc and copper ashes.

However most of the countries receiving the waste are ill-equipped to process or dispose of it. Efforts to extract recyclable or potentially valuable elements from the waste attract the poorest of people working in uncontrolled and exploitative circumstances. Lack of the most basic regulations, like use of protective clothing, leave them vulnerable to poisoning and disease.



The Basel Convention

In 1989 the Basel Convention on the Control of Trans-boundary Movement of Hazardous Waste for Final Disposal was established to stop the industrialized nations from dumping their waste on less developed countries.

In 1994 the Basel Ban was passed which placed an immediate ban on hazardous waste exports from developed countries to less developed countries sent for final disposal, and a ban on hazardous wastes sent for recovery operations by December 31st 1997.

In 1995 the Basel Ban was amended into the Basel Convention in order to ensure the Ban would be respected and legally binding.

Spotlight

India a Waste Dump of Chemicals

From American municipal sludge to Indonesian garbage, Arabian mining and Kuwaiti rubber waste, copper, zinc aluminium—India not only is fast becoming a dumping ground for “foreign waste” but pays billions of rupees for it to boot.

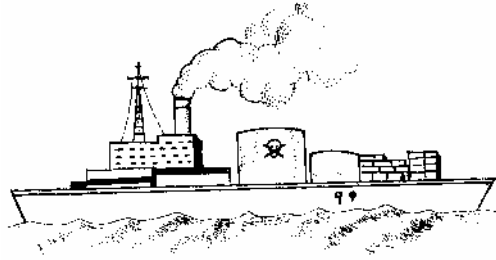
Shiploads of old paints, chemicals, pesticides, tyres, crashed automobiles, discarded ships batteries, radioactive waste, ash, slag, asbestos, mercury, lead are imported by scrap traders and sent to illegal backyard recycling units, in spite of a Supreme Court ruling banning the trade of hazardous materials.

“Lax laws, zero enforcement policy and ignorance among the locals has led to uncontrolled import of scrap, which most of the times is rich in poisonous, toxic and radioactive substances”, says environmentalist Iqbal Malik. But those importing the “foreign waste” say their trade remains obscure and unorganized in the absence of any uniform trade policies of the government and a threat from the environmentalists. “Western countries trade only in low-recovery potential scrap which they find uneconomical to recycle. We do not have any choice but to trade in this low-quality scrap,” says Sudhir Agrawal, a metal scrap trader.

Being a Third World country, India cannot afford virgin materials for industrial use but “we can at least be selective while importing this scrap”, Dr. Malik says, adding “there is need to formulate exhaustive quality-control systems throughout the country to check what is coming from where. ‘The import of scrap was regulated earlier, but after government decanalised scrap imports in 1992, traders got full freedom to import whatever scrap was available in the international markets”, officials of Mineral and Scrap Trading Corporation, a government undertaking, say. India imported 980 million tonnes of scrap in 1988, which increased to 1 885 million tonnes worth over Rs 11 billion during 1997-98. Of this 400 million tonnes is hazardous scrap, most of it being produced by the developed world, says a report by an NGO Vatavaran, on scrap trade. About 1.5 lakh tonnes of imported copper scrap is used for making electric wires; plastic waste is used to churn out moulded furniture, household items and toys.

Over 38 lakh tonnes of paper is recycled into stationery and packaging material while the ash of metals like zinc feeds the fertilizer units. Lead acid batteries are recycled for use in the domestic market. But most of this takes place in small recycling units which lack both infrastructure and technology. “Increased dumping has led to unchecked growth of illegal backyard recycling units almost in the whole country. Workers are dying prematurely and traders are making a quick buck,” the report says.

(Source: Kaur, A. “India a Waste Dump of Chemicals”. *Asian Age (New Delhi)*, 29.09.98).



Activity - Cross Country

Thrust Area	International Trade and the Environment
Group Size	About 30
Time	30 minutes
Materials	Paper tokens (see below)

Objective

To make the participants aware of the international trade in waste materials and the dynamics involved.

Preparation

For this activity you will require:

Paper tokens (the size of visiting cards) of three types: One shape or colour to indicate natural resources, another shape to indicate waste generated, and a third to indicate money. For each of the three kinds, make different units of paper tokens, some in 10s and some in units.

In all you will require:

Natural Resource Tokens

Marked with 10: 111

Marked with 1: 31

Waste Tokens

Marked with 10: 27

Marked with 1: 49

Money Tokens

Marked with 10: 106

Marked with 1: 69

Procedure

Divide the participants into small groups of four to five individuals each. There can be a maximum of 13 such teams in this game. If there are less than 50 participants, they can be made to pair up or they can play in groups of three each.

Give the following names to the groups: A, B, C, D, E, F, G, H, I, J, K, L.

The table below indicates the income, waste generation and natural resources of each country.

Distribute the natural resources, waste and money tokens to each country as per the list. (For example, to the country 'A' you will give:

Money tokens: 26 ten value money tokens and 9 unit value money tokens. Waste tokens: 10 ten value tokens and 2 unit value tokens. Natural resource tokens: 21 ten value tokens.)

<i>Country: A</i> Money: 269 Waste: 102 Natural Resources: 210	<i>Country: G</i> Money: 26 Waste: 7 Natural Resources: 1
<i>Country: B</i> Money: 3 Waste: 5 Natural Resources: 64	<i>Country: H</i> Money: 36 Waste: 8 Natural Resources: 545
<i>Country: C</i> Money: 2 Waste: 1 Natural Resources: 1	<i>Country: I</i> Money: 187 Waste: 46 Natural Resources: 2
<i>Country: D</i> Money: 1 Waste: 3.5 Natural Resources: 13	<i>Country: J</i> Money: 187 Waste: 81 Natural Resources: 40
<i>Country: E</i> Money: 7 Waste: 1 Natural Resources: 1	<i>Country: K</i> Money: 396 Waste: 45 Natural Resources: 24
<i>Country: F</i> Money: 6 Waste: 13 Natural Resources: 132	<i>Country: L</i> Money: 9 Waste: 7 Natural Resources: 108

Tell the participants that the game will have six rounds. The country which manages to increase its natural resource tokens and money tokens by the biggest number, and decrease its waste tokens by the biggest number, by the end of the six rounds, wins the game.

Ask the participants why an increase in the number of natural resource tokens, money tokens and a decrease in the number of waste tokens indicate a winner.

They can discuss: Do the money tokens indicate that the country can spend more on health, education, transport and other essential services? Does more waste imply environmental deterioration and damage to human health? Do more natural resources imply that the country has a stable environment, and enough natural resource capital for development?

The task for each country is to gather as many natural resource tokens and money tokens as they can and dispose off as many waste tokens as they can. They can do this by buying and selling their tokens. For example, a country may want to sell some of its natural resource tokens in exchange for a few money tokens. Another country wishing to dispose off excess waste may offer someone money for taking their waste tokens.

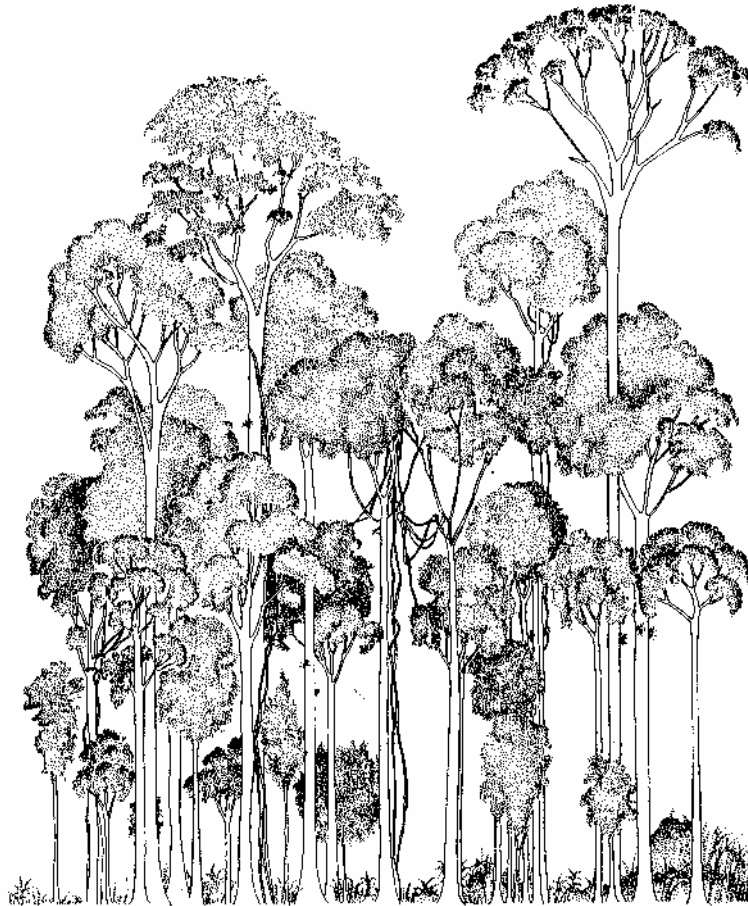
Each country team will have to elect a leader to negotiate deals with other countries.

Each country first has internal meetings with their leaders. The time given for the internal meeting is 3 minutes.

They then send their leaders to an international meeting of all countries to negotiate the deals. Each international meeting lasts for 5 minutes. Only the leaders can discuss in the international meeting. The other team members can only watch from their respective places.

After each round of meetings, the leaders come back to the country teams to report and discuss the strategy for the next round. Ask each team to take stock of the number of the money, waste and natural resource tokens they have at the end of each round.

After the sixth round, the tokens that each country has are counted and compared to the original numbers of the different tokens they had. The country which has increased its natural resource and money tokens by the biggest number and decreased its waste tokens by the biggest number wins. This is calculated by adding the numbers of the money and natural resource tokens gained and waste tokens lost during the game. The country with the biggest number wins.



Discussion

What were the dynamics that went on in the negotiations between the different countries?

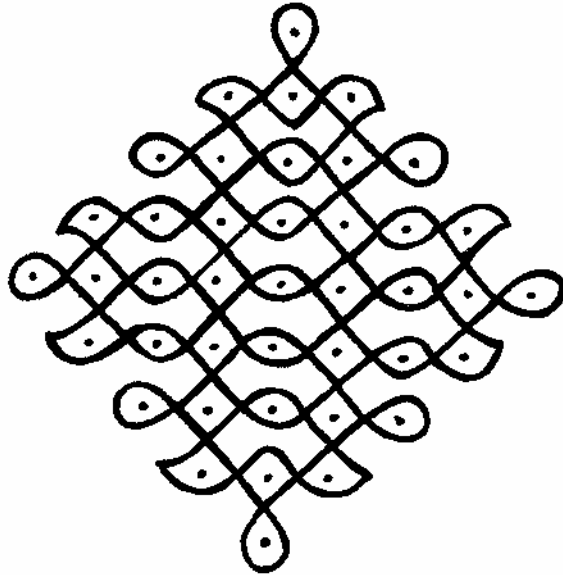
Some countries rich in money may try to lure countries with lesser money to sell their natural resources for a price. They may also try to get poorer countries to accept waste in exchange for money.

Countries with little money may take to selling their natural resources for money. They may also accept waste materials from other countries for a price. There may be a lot of persuasion and bargaining going on during the game. One country may set a certain price for its natural resources and refuse to decrease the price. Another country may offer cheaper prices for its natural resources and take advantage of the demand. Towards the end of the game, that is towards the fifth and the sixth rounds, the money offered for accepting wastes may suddenly increase.

Do these dynamics reflect reality?

International dynamics are as complicated and volatile as the dynamics that went on during the game. Trade in waste materials is not something fictitious. Industrial and

agricultural wastes are often shipped from one country to another. Most of these are available for cheap and meant for use in the receiving country as raw materials.



24 Hours

Before We Begin

The availability of time influences people's access to opportunities.

Women especially suffer from a shortage of time because of the triple load they carry: child-bearing and rearing, family and household management, and production or income-earning activities. Time-use studies reveal that in almost every country women spend more hours than men in work—paid and unpaid. Human Development Report 1995 showed that of the total time spent in work, women on average account for 53 per cent and men for 47 per cent. As demands on women's time increase, they share their work with their daughters and with other children, but very rarely are household responsibilities transferred to men.

Some circumstances—such as having a water supply close to home and transport to the work place—increase the time available. Others—such as deforestation and pollution—reduce the time available and increase the vulnerability of women.

The importance of time for poor people has policy implications. Policies that impose a financial burden on families, such as a reduction in health care benefits, may also impose a time burden—with further repercussions for the ability to escape poverty. And policies that reduce the time burden of poor people, such as by improving the water supply, can remove a critical constraint on their ability to escape poverty.

Spotlight

Regenerating Forests: Tribal Women Show the Way

Six years ago, women from Murgabani village in Jama block of Santhal Paragana district, Bihar, traversed 10-12 km to collect fuel wood. Today, they have shortened the distance to just one km. This they have achieved by protecting the adjoining forest. “Not cutting timber for sale when there was no food at home involved great sacrifice in the short run. But the vision of better earnings and more food in the future kept us going”, said Makhanni Tudu of Murgabani.



“We had to masquerade as men in order to save our forest”, said Kalashari Rani, a tribal woman from Jamdali Paharpur village in Santhal Paragana. It was Sukhiya Surain who has thought about this plan. She would don an old forest guard uniform, tie a lock of hair across her chin and sport a long red tikka on her forehead so that she looked like a ‘daku’ [dacoit], “When women from neighbouring villages came to loot our forest, I would spring up from behind the bushes, frantically wave a stick at them and let out ear-piercing yells. The women would think that they were being pursued by evil spirits out to feast on human blood and would run away—never to return.”

Soon when word spread that a monster was at large and since some encroachers “actually saw the apparition”, no outsider dared to risk an entry. Yet when the forest protection committee was formed, the men kept the women away, telling them that this was not their work.

“Considering that it is a women’s work to go to the forest to collect fuel-wood, food and fodder, we alone will be able to protect it,” insisted Kalashari. The women forced their way into the committee by influencing their men folk within their houses and empowered by the support they got from Agrarian Assistance Association (AAA), a local NGO which stepped in two years after the forest protection had begun.

The forest protection committee set up the rules for sharing the forest produce, including timber for house-building and for agricultural implements. It selected two forests guards from among themselves and paid them with grain collected from every household. The women, in pairs, shared the job of keeping watch whenever necessary.

“Before 1991, the forest guard used to take grain, chickens and liquor and give us permission to fell trees which we then sold for income,” said Kalashari of Jamdali Paharpur, telling a story common to all villages. Then, as the number of mature trees dwindled, so did the income for the tribals. The women explained that while the men were sore because they could not earn cash from the timber, the women found it impossible to secure enough food for the family.

“The women have benefited more than men from the protected forest”, said Sumi Mormo of Jamdali village. “Earlier I had to measure what I cooked. Now I don’t need to do that, for there is enough to eat in every season, even when we have run out of our harvested grain.” The forest gives them fruits, oil, mushrooms, edible flowers, green leafy vegetables, gur, and even soapy plants used for washing. The regreening has meant increased cash incomes for the women who now sell *Pattal* (leaf plates) and brooms, among other things, in the weekly hat (market).

“Ever since we saved our forest, I get thrice the amount of *saag* for my family and even the number of *pattal* leaves available have increased threefold,” said Monika of Murgabani. In both Jamdali and Murgabani, the thick foliage and woody stems have completely hidden the naked stones that had emerged following deforestation in the 1980s. District collector Ravi Parmar acknowledged that the tribals, both Santhals and Paharias, had effectively managed to protect many forest patches for more food and to augment their income. The regreening has also led to increased agricultural production on the flatter slopes and in the valleys of the rolling countryside by controlling soil erosion, raising the water table and making the soil richer with plant waste that gets washed down in the rains. Most important, the tribals have been able to partly avoid the moneylenders to whom they flocked for food during the months when their grain finished.

“The forests are back because we have nurtured them. How can anyone else cut them?” asks Kalashari. The women concede that timber might belong to the forest department but certainly not the non-timber forest produce. Strengthened by their achievement, the women say they are now in a better negotiating position with the government.

[Source: Kapoor, A. “Regenerating forests: Tribal women show the way”. *Times of India*, 08.03.99].

Activity - 24 Hours

Thrust Area	Gender
Group Size	About 20
Time	1 hour
Materials	Two pieces of cord paper cut into circles (each having a diameter of about 30 cm), two sets of colour pencils, paper.

Objective

To help participants become aware of the roles and tasks performed by men and women in different situations.

Procedure

Divide the participants into two groups. Give one circle of card to each group. Ask the participants to divide each of the circles into twenty four equal sectors.

Tell one group that their subject is a man. Tell the other group that their subject is a woman. Tell them they have to agree as a group on the situation of the man/woman who is their subject. For example: What is the income class of the subject? What is his/her age? What is the subject's main occupation? Is the subject from a rural or an urban background? etc.

Tell both the groups that their task is to make a list of all the activities their subjects perform each day and the average time spent on each of these activities. They may choose to get this information by interviewing any man/woman who matches their subject.

After they have completed making the list, ask the participants to make a pie chart of the time their subjects spend on each activity on the card circle. They can use different colour codes for different activities. For example, cooking may be red, eating may be green, etc.

After the mapping, ask each group to make a presentation of their time circles.

Discussion

Is there any difference between the tasks that men and women do? What are the differences?

There will usually be noticeable differences between the tasks that men and women perform. For example, women may be involved with cooking, etc.

Is there any difference in the time that men/boys and women/girls spend on different tasks? What are the differences?

There will usually be differences between the times that women/girls and men/boys spend on different tasks. For example, men may spend more time watching television or reading the newspaper than women do.

What are the reasons behind these differences?

Men and women are expected to perform different roles in society. This is referred to by the term 'gender'.

Are the roles and responsibilities taken up by men/women the same for all men/women?

'Men' and 'women' are not homogenous groups. That is, all men are not the same just as all women are not the same. For example, the roles and responsibilities of a woman who is a landless labourer in a village may not be the same as the roles and responsibilities of a woman who is a marketing executive in Mumbai. Yet there are similarities. For instance both the women may be expected to be primarily responsible for the rearing of their children.

What impact do the roles of men and women have on their time?

Women are generally involved in multiple roles—taking care of children, managing the household, income generation, etc. These multiple roles demand a lot of time and

energy from women. Men on the other hand are generally involved in a single role— income generation. This may leave them with more time and opportunity for social interaction, learning, political participation, etc. Women deprived of this time are also deprived from participation in such activities.



What's on the Menu?

Before We Begin

In the past 30 years, agriculture has made remarkable progress in increasing the world's food supplies. Although world population doubled over this period, food production rose even faster. Per capita food supplies in the developing world rose from less than 2,000 calories per day in 1962 to more than 2,500 calories in 1995, driven by the Green Revolution—the combination of better seeds, expanded irrigation, and higher fertilizer and pesticide use—as well as by the rapid growth in food imports from the rest of the world.

But the rate of growth in world food production has started to slow. Feeding an ever-larger world population in the future is a major challenge.

Globally, nutrition seems to be improving. Life expectancy is growing worldwide, and better nutrition is one of the main factors behind this rise. Looking at the global data, it seems there is plenty of food. But the problem is not just that of food production for the world as a whole.

The most widely recognized cause of malnutrition is poverty—the lack of money to buy food or the means, land, resources, and knowledge needed to grow it.

Other environmental and social factors affecting nutrition include shortage of potable water, famine, displacement of people, etc. Production failures at the local level are a major cause of hunger.

Spotlight

How Many? How Much?

Although Malthus was primarily concerned with the additional demand for grain generated by population growth, rising affluence is also playing a role.

In a low-income country such as India, grain consumption per person is less than 200 kilograms per year and diets are typically dominated by a single starchy staple—rice, for instance. With scarcely a pound of rice available a day per person, nearly all must be consumed directly, leaving little for conversion into animal protein. For the average American, on the other hand, the great bulk of the 800 kilograms daily grain consumption is taken in indirectly in the form of beef, pork, poultry, eggs, milk, cheese, ice cream and yogurt. At the intermediate level, in a country like Italy, people consume 400 kilograms of grain a day. Future food price stability thus depends on expanding production fast enough to keep up with both population growth and rising affluence.



One question often asked is: How many people can the Earth support? This must be answered with another question. At what level of consumption? If the world grain harvest of 1.87 billion tons were expanded to 2 billion tons in the years ahead, it would support 10 billion Indians or 2.5 billion Americans. To answer the question of how many people the Earth can support, we first have to know the level of consumption we expect to live at.

Source: Brown, L., Gardner, G., Halweil, B. *beyond Malthus: Sixteen Dimensions of the Population Problem. World Watch Paper 143*. September 1998).

Activity - What's On the Menu?

Thrust Area	Nutrition and Equity
Group Size	About 35
Time	45 minutes
Materials	Copies of Food Chart, People's Cards [see below]

Objective

To help the participants become aware of the inequities in food consumption.

Preparation

For this activity you will need:

A large copy of the menu chart on display, papers and pencils, people cards.



Items	Calories per 100 gms	Calories per Rupee	Cost per 100 gms	Amount per Rupee
CEREALS				
Rice	345	224	Re 1.50	65 gms
Wheat	341	341	Re 1.00	100 gms
PULSES				
Redgram	335	117	Re 2.80	35 gms
GREEN LEAFY VEGETABLES	51	51	Re 1.00	100 gms
OTHER VEGETABLES	32	32	Re 1.00	100 gms
ROOTS AND TUBERS				
Potato	97	97	Re 1.00	100 gms
Onion	50	50	Re 1.00	100 gms
MILK				
Buffalo milk	117	58	Re 2.00	50 gms
OILS	900	225	Re 4.00	25 gms
OTHERS				
Sugar	398	248	Re 1.60	62 gms
MINIMUM NUTRITIONAL REQUIREMENTS				
Green leafy vegetables	100 gms			
Other vegetables	100 gms			
Roots and Tubers	100 gms			
Milk	300 ml			
Pulses	60 – 90 gms			
Cereals	300 – 700 gms			

People Cards: Cut a piece of chart paper into cards of the size 10 cms x 15 cms. Write the following paragraphs, one on each card:

Software professional: 25 year old woman. Works for 8 hours a day. Much of the work includes programming on the computer. Spends about 2 hours each day working at home (buying groceries, cooking, etc.). Needs about 1900 calories a day. Can afford to spend Rs. 100 on her food each day.

Construction worker 40 year old male. Works for 10 hours a day lifting loads, digging, etc. Needs 3900 calories a day. Can afford to spend Rs. 15 on his food each day.

Business man: 35 year old male. Works for 10 hours a day. Much of his work is collecting payments in his shop, sitting at the billing counter. Needs about 2400 calories a day. Can afford to spend Rs. 50 on his food each day.

Farm labourer: 20 year old woman with a three month old child. Works on the farm weeding, digging, feeding animals, etc. for about 6 hours each day, and for the home [collecting fuel wood, fetching water, cooking, etc.] for about 3 hours. Needs about 3000 calories a day. Can afford to spend Rs. 10 on her food a day.

School student: 15 year old. Is at school for 7 hours a day. Plays for 1 hour, attends tuition classes for two hours and does home work for another hour each day. Needs about 2360 calories a day. Family can afford to spend Rs. 30 on his/her food each day.

Procedure

Divide the participants into five groups of about 5-7 people each.

Give one 'people card' to each group.

Display the food chart at a location from where all the participants can see it.

Ask each group to read the 'people card' they have and prepare a menu for the person on the card using the food items available on the chart. The group should try to make a menu that meets the calorie and nutritional requirements of the person within the person's budget.

Give the participants 15 minutes to complete this task.

Then, ask each group to present their menu to the rest of the participants.

Discussion

Which menus were easier to make and which were more difficult to make? Why?

It is generally easier to make a menu for people who can afford to spend more on their food requirements. In fact, because there is money available, the participants may spend it to buy more food than is actually required for the person.

It is difficult to make a menu for someone whose ability to spend on food is limited. Participants may have to struggle to meet all the nutritional requirements within the limited budget.

Which of the people (of those featured on the PEOPLE CARDS) could meet their nutritional requirements? Why?

Not all the people featured on the PEOPLE CARDS may be able to meet their nutritional requirements, the main reason for this being lack of purchasing power.

Is there a difference in the type of food chosen for the different people? Why?

The menus made for all the people on the 'People Cards' may not feature all the different types of foods listed under 'Minimum Nutritional Requirements'. The diets of people with more purchasing power can contain different kinds of food stuffs and provide the range of nutrients required including minerals, vitamins, iron, etc. It is not necessary however that everyone who can afford to eat a healthy diet. On the other hand, the diets of people with poor purchasing power may find it difficult to meet the requirements of both the required calories and the variety of food stuffs. This is a reflection of what happens in reality too.

Who Is Healthy?

Before we begin

Good health is the foundation of human welfare and productivity. Good health depends on social, economic and spiritual development, and a healthy environment, including clean air, food, water and living space.

Environmental health problems vary dramatically from region to region, reflecting geography, climate, and the country's level of economic development and policy choices.

Environmental hazards to health fall into two broad categories. The first is a lack of access to essential environmental resources including sufficient and clean water, food, shelter, fuel and air. The second broad category is exposure to hazards in the environment. This includes noxious chemical and physical hazards in the environment as well as biological hazards such as micro-organisms and parasites that contribute to infectious diseases.

In developing countries such as India, environmental threats to health come from both risks associated with poverty and risks associated with industrialization. The risks associated with poverty include inadequate water and sanitation, exposure to vector-borne diseases, etc. The risks associated with industrialization include exposure to air pollution, toxic wastes, etc.

Spotlight

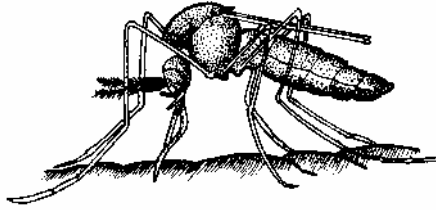
Human Health—In Hot Danger!

Of the many scientists who have projected, predicted and warned of the likely health effects of climate change, almost all agree on the basics: the effects will be widespread and unpredictable, they are likely to be severe, and many people across the world will die as a result.

The likely health effects can be divided into two categories: direct and indirect. Direct effects will result from direct exposure to the weather extremes that climate change will cause, for example: heat-stroke, hypothermia and deaths or injuries resulting from tidal waves, floods, hurricanes, etc. Indirect effects will result from subsequent changes in environment and ecosystems, for example: the spread of vector-borne diseases into new areas, nutrition problems arising from crop failure, diseases spread by algal blooms in warming seas, and even the mental health problems which may result from social and political dislocation.

We are already seeing examples of some of the more obvious direct effects of climate change on human health. For example, the Indonesian forest fires, started by humans and exacerbated by warmer and drier than average weather, caused a massive increase in respiratory illnesses.

A major indirect threat to human health from climate change will come from an increase of 'vector-borne' diseases. Vector borne diseases are diseases spread by pests, insects and other small creatures, such as snails.



Many disease-carrying insects—most obviously the malarial mosquito—thrive in warm conditions. As the world warms, they will begin to find more places where they can breed. Malaria is predicted to spread from affecting 45 per cent of the population, as it does today, to affecting 60 per cent, by the latter half of the century. It seems that in some places this is already beginning: malaria has already begun to affect the previously mosquito-free African highlands, and upland rural areas of Papua New Guinea. Urban centres are beginning to suffer as well: many central African cities are experiencing urban malaria for the first time.

Climate change can also have a major impact on water resources and sanitation by reducing the water available for drinking and washing, and lower the efficiency of local sewerage systems, leading to increased concentration of pathogenic organisms in raw water supplies,

One obvious, but often overlooked, consequence of the health problems which climate change precipitates, is the financial cost of dealing with the problem. Economists and industrialists who insist that taking any action to combat climate change will threaten the world's economies, might like to consider the economic costs of doing nothing. In terms of human health, these costs are already being borne: The 1991 cholera epidemic is reported to have cost Peru over \$ 1 billion, while airline and hotel industries lost between \$ 2 billion and \$ 5 billion from the 1994 Indian plague. Cruise boats are already avoiding islands in the Indian Ocean plagued by dengue fever—and are threatening the area's \$ 12 billion tourist industry in the process.

(Source: Kingsworth, P. *Human Health on the Line*. *The Ecologist*, Vol. 29, No. 2, March/April 1999).

Activity - Who Is Healthy?

Thrust Area	Human Health
Group Size	Up to 35
Time Period	30 minutes
Materials	Copies of the Health List and Health Report (see below)

Objective

To help the participants understand the factors influencing human health and the degree of control individuals have on their health.

Preparation

You will need the following materials for this activity:

Health List: Make copies of the following list along with the accompanying format on sheets of paper, one for each group of participants.

1. 30 year old woman. Mother of six children aged between 15 years and 1 year. Daily wage labourer. Anaemic. Main earning member of the family with an alcoholic husband and an aged mother-in-law dependent on her.

2. 25 year old man. Narcotic addict. Initiated into drug abuse by friends. Has severe withdrawal symptoms when he does not inject the drug. Suspicious of de-addiction centres.

3. 45 year old man. Worker in asbestos factory. Exposed to asbestos fibres for 9 hours each day. Does not use protective gear as it is heavy and uncomfortable.

4. 50 year old farmer. Uses pesticides without protective gear. Unaware of the harmful effects of pesticides. Unwilling to stop using chemical pesticides due to fear of poor yield and reduced profits.

5. 13 year old girl. Frequently gets bouts of diarrhoea. Lives in a slum settlement, **with** poor sanitation facilities. The only source of water for 25 households is a single public tap.

6. 55 year old senior executive. Works indoors for 12 hours each day for seven days a week. Highly stressful but sedentary job in a large city corporate office. Most meals consist of rich foods at expensive restaurants. Experiences bouts of depression.

Format for Health Report

Person	Health Status	Causes	Who/What Influences Health Status?

Procedure

Divide the participants into groups of five people each. Give one copy of the list of people to each group.

Tell the participants that they have to make a health report for the people in the list in the given format.

<i>Person</i>	<i>Health Status</i>	<i>Causes</i>	<i>Who Influences?</i>
Woman 30yrs	Anaemia	Poor nutrition	Husband

They have 15 minutes for the task.

After the groups finish making the report, ask them to rank the persons on the health list from the most healthy to the least healthy. The participants also have to specify the reasons for the ranking they decide upon.

They have 10 minutes to complete the ranking exercise.

After this time, ask the groups to present their health reports and the health ranks. The other groups can give their feedback and comments.

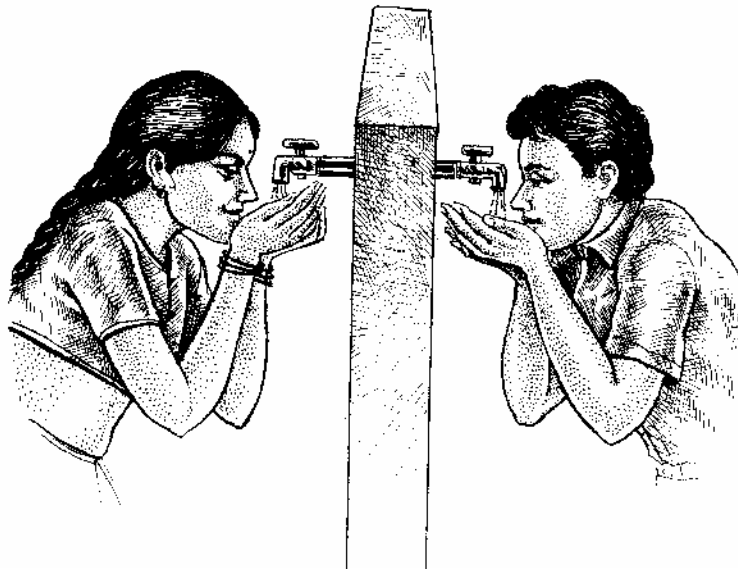
Discussion

How is human health influenced by the environment?

The environment which sustains life can also be a source of ill health. Lack of clean water and air, poor sanitation, inadequate housing, and lack of protection from disease vectors, exposure to toxic substances, unhealthy eating habits, stress, etc., are the main causes for human ill health.

Are individuals always in control over their own health?

The health of an individual may not always be within his/her control. A number of social, political, economic and environmental factors can influence and impact human health. For example, while a person living in a slum may know that boiling water before drinking is good, he/she may not be able to do so due to economic reasons.



Section three



Whose Plans Matter?

Before We Begin

Conservation requires people's recognition of their responsibility to maintain the environment, and their involvement in this process.

Individuals, groups and organizations need to know about and participate in environment and development decisions, particularly those that effect their communities.

JFM helps tribal communities in conserving forest wealth

The tribals in Ramakrishna Nagar, an interior tribal village in the Anantgiri forest range of the Vishakhapatnam forest division, saw no difference between precious sandal wood and ordinary wood. Both served a common purpose—they were used as fuel. Very

few sandal wood trees remained in the Bondom reserve forest as a testimony to the indiscriminate felling of the precious forest wealth by the innocent tribals.

This was the scene until three years ago. The same tribals are now cautious about their use of the precious forest wealth and the once degraded sandal wood is being seen once again in the forests. This remarkable change is because of the Joint Forest Management (JFM) scheme.

The tribals were motivated by the Forest Range Officer and his staff to form Vana Samrakshana Samithis (VSSs). After forming the Ramakrishna Nagar VSS under the JFM, the VSS members undertook plantation in areas where they once practiced shifting cultivation. Species such as bamboo, jack fruit and silver oak were planted. Soil and land conservation works were taken up on the slopes. Cleaning and copice cutting of the viable root stock was also carried out to facilitate the growth of natural species. The VSS members started stall feeding their cattle by cutting grass from JFM areas. Sandal wood has come up excellently due to protection efforts by the VSS members. The protected sandal wood patches in the JFM area will yield lakhs of rupees in due course.

Drinking water wells, Vana Vigyana Kendras, public address systems, income generation activities, digging of irrigation wells and distribution of smokeless chullas are also part of the scheme.

The Visakhapatnam circle has about 6500 square kilometres of forest area, covering three districts, namely Visakhapatnam, Vizianagaram and Srikakulam. The demand for forest resources is enormous and the pressure of human and cattle population is very high and ever increasing. It is far beyond the carrying capacity of the forests. The hilly forest areas are heavily affected with 'podu' cultivation (shifting cultivation) by local hill tribal communities.

Recognizing that past strategies have failed to reduce forest degradation and deforestation, the Government of India and the state government have begun to change the approach to forest management and conservation. National forest policies have shifted emphasis away from commercial exploitation towards rehabilitation of degraded forest lands and protection of forests in general. New strategies also attach importance to the welfare of the local population and emphasize their active participation and implementation of activities leading to the better management and conservation of forest resources. This concept has led to the emergence of JFM.

JFM is practiced and implemented through the formation of VSSs in the entire circle of Vishakhapatnam. The VSS is a local body of the village, constituted as per the JFM guidelines, for the protection and development of the forest areas. This enables the VSS members to share benefits derived from forest areas allotted to the VSS.

Besides protection of forests, the VSSs are also involved in the development of forests. They make efforts to rehabilitate degraded forest areas by protection and by undertaking soil and water conservation activities. Planting of non-timber forest species selected by the people is also taken up. Fodder species are also planted to meet the need for fodder for animals.

Village development is integrated with JFM to achieve overall development of the people. Developmental activities like soil moisture conservation, horticulture, agriculture, water harvesting structures, income generation activities, etc., are also taken up.

(Source: “JFM helps tribals in conserving forest wealth”. *Newsline (Hyderabad)*, 17.03.97).

Activity - Whose Plans Matter?

Thrust Area	People's Participation
Group Size	Between 10 and 20
Time	One and a half hours
Materials	Village Card and Development Organization Card (see below).

Objective

To illustrate the importance of involving people in planning for their development.

Preparation

For this activity you will need to prepare the following:

Two pieces of paper or cards with the following text neatly written or typed on them:

Card 1: Village

You live in a very small, remote, hill village called Dharampur. It is located in the district Kalma. There are about 30 households in your village and the total population is 150.

The main occupation of the people in your village is agriculture. You grow wheat and maize for your food requirements. Often crops fail and there is never enough food. Every one in your village is very concerned about the failing crops. You know that the reasons behind the crops failing is the lack of water to irrigate the fields and the decreasing fertility of the soil. You would like to know what you can do to store rain water and to increase soil fertility.

Another problem you face is scarcity of drinking water. There is no water supply to the village. The only well that is there is now badly silted.

Health is also a major concern for you. Very few people in your village have lived for more than 50 years. Many young children also die from diseases. The nearest hospital is 10 miles away. To reach the hospital you have to walk for 4-5 miles and then catch a bus.

About 10 households in your village have a few goats. Only 5 families have a single cow each. Many people cannot think of having a cow or a goat because buying one would cost a lot of money. Also, even those people who have goats and cows face the problem of shortage of fodder to feed the animals.

The slopes of the hill on which your village is located, are getting barren. People have to walk for four miles every day to collect fuel wood. People who own animals also have to take them to a place 4-5 kms away for grazing.

The situation

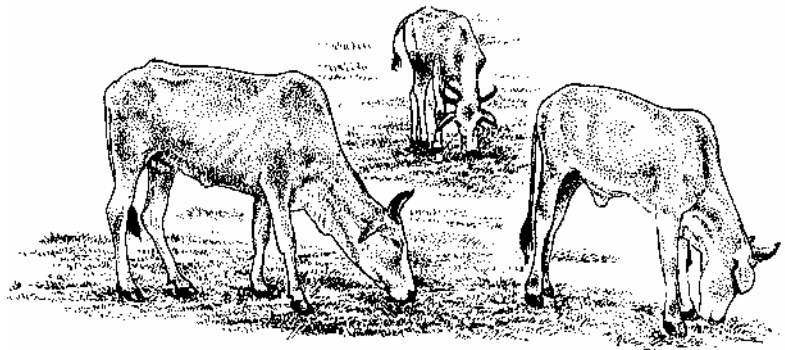
An outside organization has called for a meeting of all the villagers. You do not know what the meeting is about. You are not sure what to expect from the organization but hope that it will be of some help in solving your village's problems.

Card 2: Development Organization

You are all officers belonging to a development organization. You have recently received funds from an international funding organization. The funds are for developing animal husbandry in the hill district of Kalma. Kalma has about 100 small villages.

Though you have received a lot of money from the international funding organization, you can afford to spend only about Rs. 10,000 on each village.

With the funds you have received you plan to educate the villagers about the importance of better breeds of cows. You also plan to help them to get loans from rural development banks to buy better breeds of cows. Your target is that at least 50 per cent of the people in each village should agree to take a loan and buy a cow. It is very important for you to meet the target.



The situation

You have to start the planned activities in Kalma very soon. You have six months to complete the planned activities. You have called for a meeting in the village of Dharampur to tell the villagers about your plans and to get them interested in approaching the rural banks for loans to buy better breeds of cows.

The villagers of Dharampur do not know anything about your organization and about what you plan to do in their village.

Procedure

Divide the participants into two groups. The ratio of participants in the two groups should be roughly 70:30—that is if there are ten participants, one group will have seven people and the other will have three people.

Tell the participants that the larger group represents a village community, and the smaller group are officers from a development organization.

Tell them that in 15 minutes time there will be a meeting of the villagers and the officers from the development organization.

Make the two groups sit in two separate corners of a room. The distance between the two groups should be such that they cannot overhear each other.

Give the groups their respective cards and ask them to read the cards carefully and understand their roles. The groups must not talk to each other. People within each group can talk to each other in such a way that the other group cannot hear them.

After 15 minutes ask both the groups to come for the meeting.

Tell the group of officers from the development organization to start the meeting by informing the villagers about the activities they plan for the village.

Tell both the groups that they have 30 minutes to discuss and come to an agreement about what developmental activities will be carried out in the village.

The officers and the villagers may, if they so desire, take breaks to have internal discussions in between.

After 30 minutes stop the discussion.

Ask the participants the following:

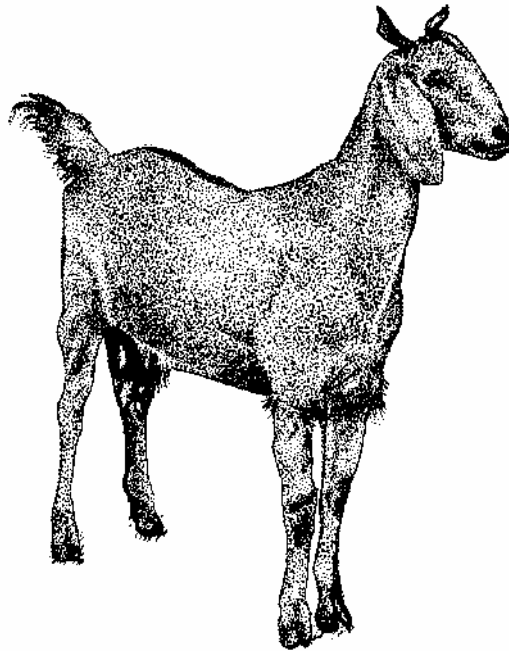
Was it possible for them to come to any agreement?

If no, why was it not possible to come to an agreement?

If yes, what was the agreement? Was it easy or difficult to come to an agreement? Why? Are both the groups happy with the agreement reached? Why?

Read out the write-ups on the village and development organization cards, so that both the groups get to know what the other group's situation was.

If the groups were not able to reach an agreement, ask them if they would like to meet again for another 15 minutes. Now that the groups know each other better, can they come to a joint decision regarding implementation of the project? Would they like to modify the project to make it more meaningful to the village situation? What other options does the development organization have?



Discussion

Are people involved in planning developmental activities that affect them?

Systems such as the Panchayati Raj have been set up and strengthened with the idea of helping people be involved in their development. In spite of systems such as these, people do not always have a say in developmental planning which may affect their lives. For example, people of a certain village may be faced with the threat of eviction due to a major development project which was conceived without their involvement.

Why is it important to involve people in planning for development?

Development plans which are made without consulting people, who will be affected by the development, may sometimes not be relevant to the people's lives. For example, an afforestation programme which involves planting tree species not useful to the local community may not succeed as the people may not offer their support to the programme.

Sometimes, such plans may even adversely affect the quality of life of the people in the long run. For example, leasing out tribal land for mining activity may provide the tribals with short term employment but may damage the land and affect tribal well-being in the long term.

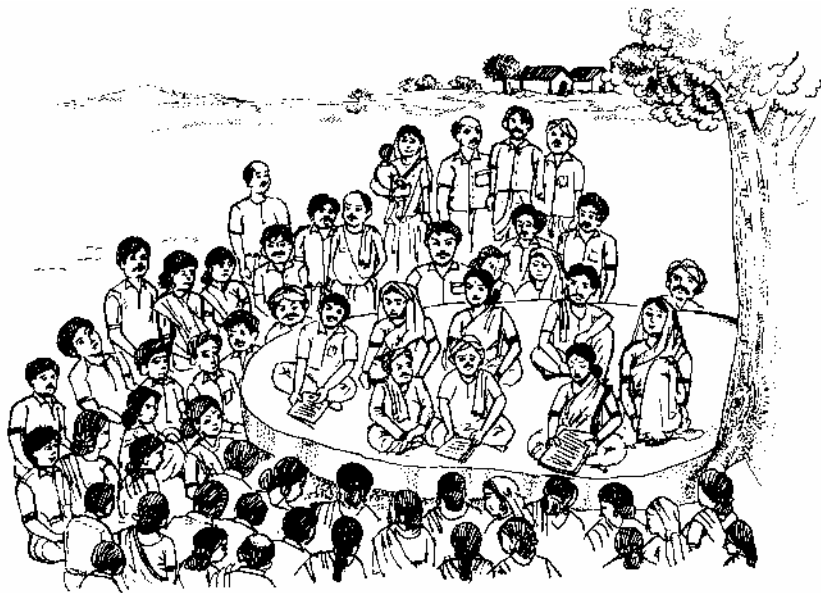
What can be done to make developmental efforts more meaningful and relevant to the local people?

Development has to be tuned to local needs and realities. Planning and implementing such developmental activity will be possible only when local people are involved in identifying their developmental needs and in designing developmental activities to meet those needs. For example, as illustrated by the activity a scheme for educating people about better breeds of cattle may not be immediately relevant in a village where people face other more pressing problems such as lack of water and health facilities, poor soil quality, scarcity of fuel wood and fodder, etc. If developmental activity was planned with

the involvement of the people it would have reflected their immediate needs and would have been more relevant to their context.

What is required to ensure that people participate in making decisions about developmental activities that affect them?

While it is crucial that people participate in decision making, ensuring meaningful participation is not an easy task. Organizing a public hearing or a community meeting does not guarantee people's participation. For participation to be meaningful, people should fully understand various facets of the issue being considered. This will require information sharing and education on all aspects of the issues discussed. Also, meaningful participation is possible only when all the concerned groups of people are empowered and are given opportunities to participate. Groups that are not usually represented in decision making processes (for example, women) should be involved.



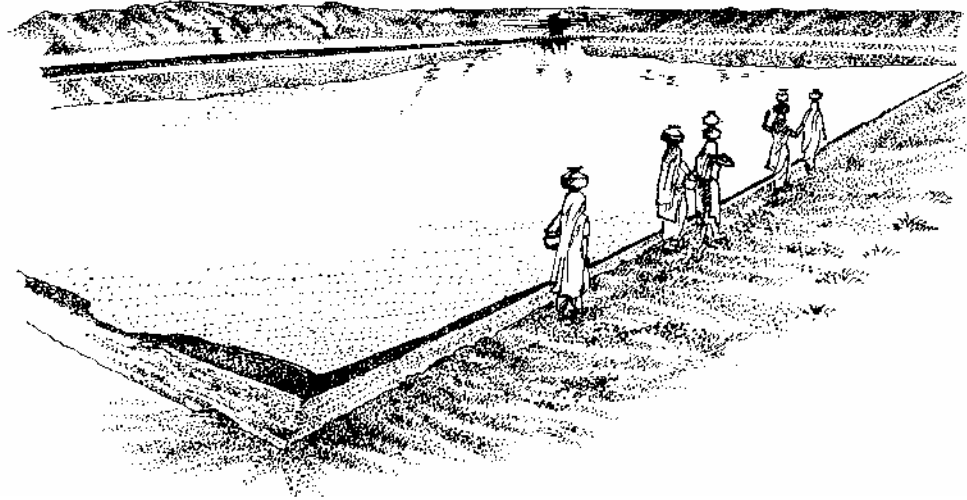
For example, consider this case:

A public hearing is called to discuss the impact of a particular industrial project which is due to come up in the proximity of a village. For ensuring that the villagers participate meaningfully in the public hearing, they need to understand all aspects of the project. For example, will it generate any employment opportunities for the village? What kind and quantity of pollution will it generate? What will be the impact of the pollution on the village environment and on the villagers themselves? etc. The idea is to objectively present all aspects of the project. The public hearing should not become a forum for propaganda by any particular group.

It is important to see that all groups of people in the village participate in the process. For example, if the women of the village do not feel comfortable participating in the public hearing, a special group meeting may have to be called exclusively for them.

Also, participation will not have any meaning if it does not lead to anything. For example, the villagers may suggest that efforts need to be made to bring down pollution

levels in the public hearing. If this suggestion is not taken up by the industry and the local authorities, the participation is pointless.



In the Name of Law

Before We Begin

A government's role in environmental management includes developing policies for the management of public resources, as also making and enforcing laws and regulations for the protection of the environment.

Environmental legislation must be dynamic in order to effectively protect the environment and prevent or rectify environmental abuses. In many cases, it becomes necessary to change the law or to make new laws and regulations as new information comes to light, or as technologies change.

Decisions which affect the environment should be made after considering all the possible consequences of each alternative. Cost-benefit analyses should incorporate environmental and human considerations as well as economic ones.

Environmental decisions should seek to improve the quality of life of all people, irrespective of their socio-economic status.

Laws that protect resources should not deprive the poor of their needs. For example, people dependent on forests must be provided access to alternative sources when their traditional resources are placed in protected areas.

The ability of the legal system to uphold and enforce environmental laws and regulations depends heavily on public support, and whether the prevailing laws and regulations are practical and enforceable.

Spotlight

Centre to phase out recycled plastic bags in two years

The Union Government has taken a policy decision to ban use of recycled plastic bags in a phased manner within two years.

“We were planning to ban use of recycled plastic bags with immediate effect in larger public interest. But, we felt, it would be a populist ban, as it would have been difficult to implement the decision in letter and spirit. Now we have drawn a strategy to ban use of recycled plastic bags in the next two years,” Union Minister for Environment and Forests Suresh Prabhu told the Indian Express.

Prabhu said he held meetings with representatives of the Recycled Plastic Bag Manufacturer’s Association and a section of consumers. “The manufacturers have agreed to my suggestions and assured full cooperation in implementing the decision,” he added.

He said at the discussions, two suggestions came up. First, the introduction of white bags— which are not to be manufactured from recycled bags—and second, manufacture of recycled bags with the thickness and colour prescribed by the Environment Ministry. “While there is no objection to the introduction of white plastic bags, the second suggestion is being examined by the Ministry,” Prabhu added.

The minister said he had also asked manufacturers to conduct a one-time operation for ouster of recycled plastic bags from the market. “It was found that recycled plastic bags were scattered all over, particularly in the metropolis and other big cities as rag-pickers aren’t interested in collecting them because they’re too thin. In fact, Mumbai witnessed large-scale waterlogging as the storm water drainage systems and outlets were choked by recycled plastic bags”, he said.

Remarking that the poor quality of recycled plastic bags makes them unsafe for storing eatables, Prabhu said: “On the one hand, we have taken a policy decision to ban such bags, and on the other, its our responsibility to discourage use of recycled plastic bags.”

He said his ministry had set up a committee headed by cardiac surgeon Nitu Mandke to study the adverse impact of plastic bags, both original and recycled ones, on human health and the environment. Several eminent persons from the field of health and environment have been appointed members of the committee.

An inter-departmental committee has also been set up to formulate a new policy for the purpose. (Source: Marpakwar, P. “Centre to phase out recycled plastic bags in two years”. *Indian Express (New Delhi)*)

Activity - In the Name of Law

Thrust Area	Environmental Legislation
Group Size	About 30
Time	1 hour
Materials	Copies of the map of Surajnagar, copies of the note on Surajnagar (see below)

Objective

To facilitate thinking on the kind of legislation and economic incentives that can be employed for environmental management.

Preparation

For this activity you will need:

Copies of the map of Surajnagar (one for each of the 5-7 groups) or a large drawing of the map displayed for all the groups to see; copies of the note on Surajnagar (one for each of the 5-7 groups):

Note on Surajnagar

The map you see is of Surajnagar. As you can see, Surajnagar has two big forested.

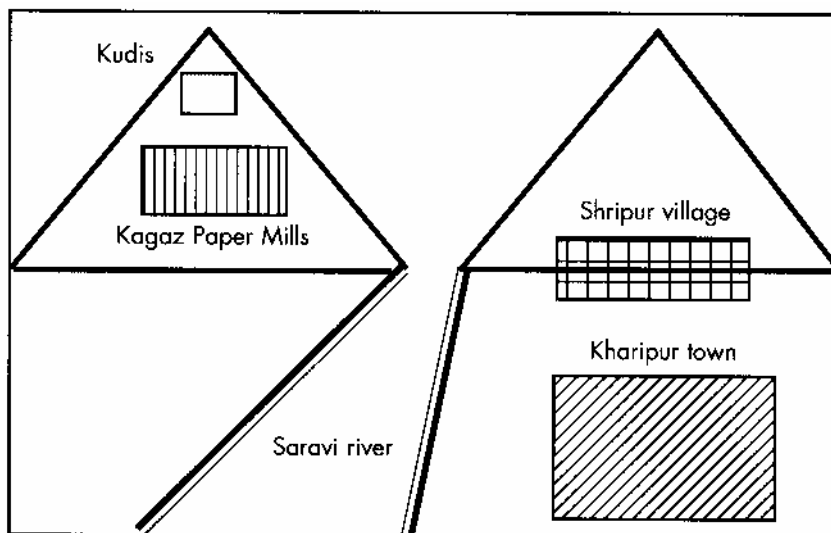
A small tribal community called the 'Kudis' lives on the top of one of the hills. The Kudis collect firewood and fodder for their cattle from the forest. They also collect medicinal plants and other forest products and sell them in the nearby village and town. The Kudis believe they are the original inhabitants of the area which is now called Surajnagar. Before the industry, the village and the town came up, their ancestors had the forests all to themselves. Now, because of pressures from the industry, from the village and the town, the forest resources are gradually declining and the Kudis fear that their future is under threat.

The village you see at the foot of the other hill is Shripur. It has about 50 households. Most of the people here are farmers. They depend upon the forest for firewood and for wood to make their agricultural implements. They also send their cattle into the forest for grazing. They use the water of the Saravi River for irrigation, and are increasingly concerned that pollution of the river water by Kagaz Paper Mills is damaging their crops and harming the health of their livestock.

The industry located half way up on one of the hills is 'Kagaz Paper Mills (KPM)'. KPM gets its raw material, which is wood, from the forest. It also uses water from the Saravi river for paper production. Waste water and solid waste materials are dumped into and on the banks of the Saravi river. Most of the paper is marketed in the Kharipur town where there is a big demand for paper for books, magazines, packaging materials, etc. The industry is concerned about increasing protests from the tribals about the use of the forest timber and about complaints from the villagers about pollution.

The large settlement you see is the Kharipur town. It is a growing town. It uses the forest wood for construction. The garbage and sewage from the town is let into the 'Saravi' river.

The map



Procedure

Divide the participants into four groups of about 5-7 each.

Give one copy of the Surajnagar map to each group or display a larger version of the map so that all the groups can have a good view of the map from where they are sitting. Ask the participants to take a good look at the map.

Tell each group of participants that each of their groups represents one group of people in Surajnagar. Give each of the groups their names: the Kudis, the villagers of Shripur, the Kagaz Paper Mill owners, and the Kharipur citizens.

Each one of the groups has been given the task of making laws, regulations, economic and social incentives for themselves and for one other group to enable effective management of Surajnagar's natural resources.

The Kudis have to make laws, regulations and incentives for themselves and for the villagers of Shripur.

The villagers of Shripur have to make laws, regulations and incentives for themselves and for the Kagaz Paper Mills.

The Kagaz Paper Mills have to make laws, regulations and incentives for themselves and for the Kharipur citizens.

The Kharipur citizens have to make laws, regulations and incentives for themselves and for the Kudis.

The groups have thirty minutes to complete the task.

After thirty minutes, ask each group to present the list of laws, regulations and economic incentives they have devised for themselves. Compare these to the laws, regulations and economic incentives devised for the same group by another group. For example, ask the Kudis group to read out the laws, regulations and economic incentives they devised for themselves. Compare this to the laws, regulations and economic

incentives devised by the Kharipur citizens group for the Kudis by asking the Kharipur citizens group to read out their list. Ask the participants to note the following:

1. What laws, regulations and economic incentives do they think will work and why?
2. Was there a balance in the numbers of laws, regulations and economic incentives devised? That is, for example, were there more laws as compared to incentives? Why was this so?
3. What is the difference in the two sets of laws, regulations and economic incentives devised for a particular group? For example, what was the difference in the laws, regulations and economic incentives devised for the Kudis by the Kudis themselves and by the Kharipur citizens?



Discussion

What is the role of legislation in ensuring better natural resource management?

Making and enforcing laws and regulations for the protection of the environment is part of the government's role in environmental management. Dynamic environmental legislation, if effectively enforced, can protect the environment and prevent and rectify environmental abuses.

Can economic incentives be effective in ensuring better natural resource management?

Economic incentives can play a role in motivating people to adopt actions that contribute to environmental conservation. For example, the Government of India offers several incentives to motivate industries to comply with the various environmental standards prescribed under different Acts and Rules to control and prevent pollution. Some of these are:

- Loans at reduced rates of interest for installing pollution control devices.
- Financial assistance to small-scale industries for setting up common effluent treatment facilities.
- Excise duty exemption for bricks and blocks made from fly ash and phosphogypsum.

What are the factors that need to be considered while making laws and regulations?

Laws and regulations have to be made considering the existing situation from all angles — environmental, social, economic, etc. For example, supposing there is a

restriction on collection of fuel wood and fodder from the forest, what alternatives do the Kudis and the villagers have?

Another equally important factor is implementation. Laws that are made have to be implementable, and need to be implemented effectively.

In addition to laws, regulations and economic incentives, what other efforts are required for environmental conservation?

Laws, regulations and economic incentives have a significant role to play in environmental conservation. But by themselves they may not be adequate. For example, a more efficient technology may be required. If the KPM is provided paper making technology that uses less water and wood, and creates less waste, it can be less polluting and be more environmentally friendly. Similarly, education and awareness are also required. For example, if the farmers of Shripur are educated about the optimum amount of fertilizer that is to be applied, the pollution of the Saravi River from excess fertilizer can be contained.

Guess What ...!/?

Before We Begin

Information and public education can lead to the development of environmental concern and action.

There is already a wealth of information that could be used for the management of the environment, but many people have trouble finding the information they need when they need it.

Sustainable Development information needs to be provided to people who need it, when they need it, and in forms they can understand.

Countries should ensure that local communities and resource users get the information and skills needed to manage their environment and resources sustainably.

Spotlight

If Only We Knew

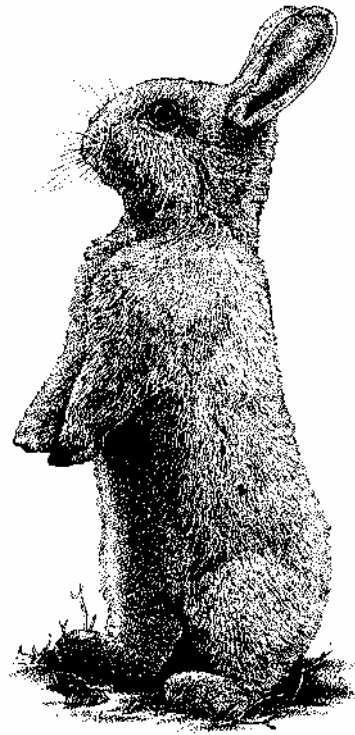
The havoc caused to the Australian economy by the import of two dozen European rabbits is legendary. In 1859 a batch of 24 rabbits was introduced for hunting on the south-east coast of Australia. These rabbits multiplied rapidly, and in sixteen years had spread all the way to the west coast.

Rabbits can thrive in a variety of climatic conditions, and they reproduce very fast. A female rabbit can have five to seven litters per year, which can mean up to 30 young ones! In Europe their numbers were kept down by foxes, but in Australia these predators were absent and so the rabbit population boomed.

They were soon competing for pasture with sheep and cattle—the mainstays of Australian economy. They were also competing with the native herbivorous marsupials. The rabbits nibbled at everything—food and forage plants, wild grasses, and even at the

bark of young pines and deciduous trees. They stripped the land bare, which led to soil erosion.

Desperate farmers tried to poison the rabbits. They put up special rabbit-proof fences around their fields. They shot them. But nothing really worked. In 1950, after years of experimentation, a viral disease 'myxomatosis' was introduced into the rabbit population. It killed millions of rabbits and only 10 to 20 per cent of them survived the disease. Since then several rabbit populations have become resistant to the virus. Today their numbers are up again-300 million, according to latest estimates!



There are examples much closer to home too...

Prosopis juliflora, a thorny tree, was introduced in the Kachchh region of Gujarat to check the spread of desertification. It has now become a problem spreading over the Banni grasslands. By taking over grasslands, *Prosopis juliflora* seriously affects the availability of fodder for cattle. *Prosopis juliflora* also has its uses. It is a source of fuel wood and charcoal. People also collect gum and honey from the tree in times of scarcity. It also helps to bind the soil. But the fact remains that its uncontrolled spread is a threat to the ecology of Kachchh.

Activity - Guess What „!?

Thrust Area	Environmental Research
Group Size	About 25
Time	30 minutes

Materials

Mystery cards, clue cards (see below)

Objective

To be aware that research and education are essential to understanding environmental situations.

Preparation

Prepare Mystery Cards and Clue Cards before the activity. You can use either the plain side of old visiting cards or paper pieces the size of visiting cards.

Mystery cards

Write the following captions clearly, one on each of the cards/papers:

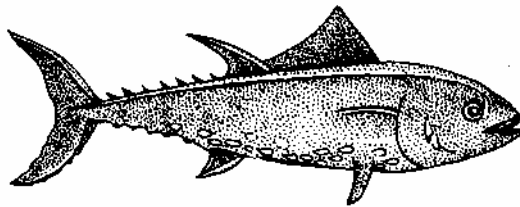
A. A man sees a jackal about to attack the nest of a beautiful bird in a national park. He rushes to save the chicks. A forest guard asks the man to get out of the park.

B. A forest fire is raging across the forest. Instead of dousing the fire with water, a forest guard lights another fire! He gets a promotion.

C. There is a great demand for fish and people are willing to pay more. But the fishermen along the coast refuse to go fishing for two months.

D. Mosquitoes breed at a lake and threaten to cause malaria in people close by. The local administration decides to spray DDT in the area and some people living nearby protest against this!

E. Saplings are being planted on the occasion of Vanmahotsav and some nature lovers are protesting!

**Clue cards**

A. The man is interfering with nature. The jackal is only having its natural food by attacking the nest. Naturally, the forest guard is angry!

B. The second forest fire was set opposite the first fire so that the fire kills itself. This stopped the fire from spreading to the whole forest.

C. The fishermen do not go into the sea when the fish are spawning. Catching fish during the breeding season endangers the next generation of fish.

D. Spraying DDT may endanger the wildlife at the lake. The chemicals that make up DDT build up across the food chain. The use of DDT has adversely affected species at

the top of the food chain—birds, mammals and fish. DDT has in fact been banned in many countries of the world.

E. The saplings being planted are of an exotic tree variety. This foreign tree species has already spread rapidly across the country and is endangering local tree varieties with whom it competes for space, water and nutrients.

Procedure

Keep the Mystery Cards and the Clue Cards with you. Take one Mystery Card and the corresponding Clue Card. Silently read both the cards, without showing them to anyone else.

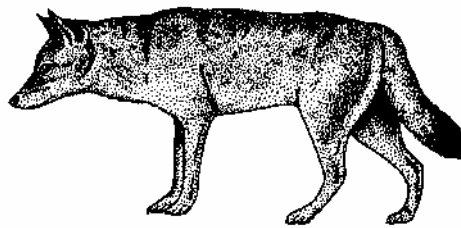
Tell the participants that you will now read out some information about a mysterious happening. The task for the participants is to find out the reasons behind the mysterious happening. Tell the participants that you know the reasons and that their task is to brainstorm and identify the possible reasons.

For each reason that is put forth by the participants during the brain- storm, you will respond by saying ‘Red’ or ‘Green’ or ‘Bulls Eye!’ When the reasons given are nowhere near the real reasons, you will say ‘Red’. When the reasons given are close to the real reason, you will say ‘Green’. When the reason given is the correct reason, you will say ‘Bulls Eye!’.

The participants have to solve each mystery within three minutes. There is no limit to the number of reasons that can be put forth. Read the mystery card aloud.

If the participants are unable to find the real reason even after five minutes, read out the information in the Clue Card.

Take another Mystery Card and proceed in the same fashion till all the mysteries are solved.



Discussion

What was the participant's first impression on listening to the mysteries?

It is natural for the participants to wonder why the people in the mysteries seem to be behaving illogically.

How did they arrive at the reasons explaining the mysteries?

Only after thinking and brainstorming will the participants be able to arrive at the reasons for the seemingly illogical behaviour in the mysteries.

Do the mysteries replicate situations that occur in real life contexts? How correct are the first impressions that we form in such contexts?

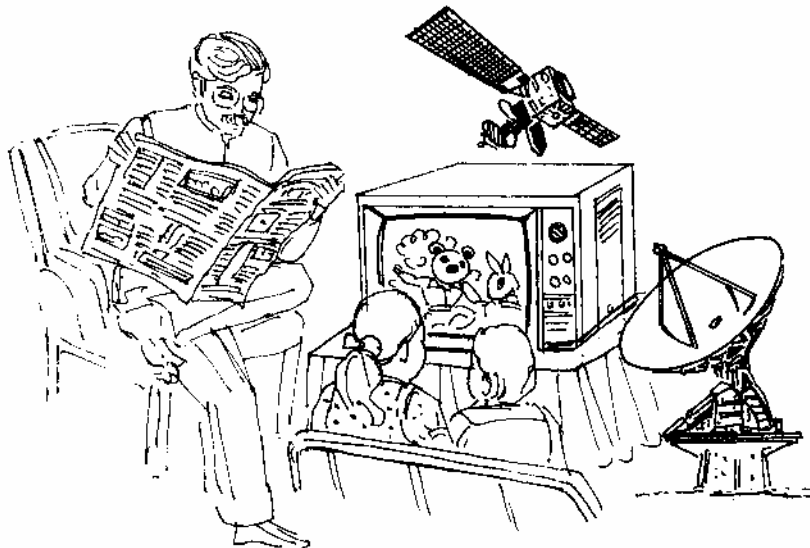
Often in real life, we are faced with situations such as those in the mysteries. For example, we hear that a group of people is opposed to the construction of a major dam that promises to bring water, electricity, etc. Why should the group oppose the building of a dam which seems to be the right thing to do? Are they being 'anti-development'? Only when issues such as the displacement of people because of the dam, the viability of the dam over time, the costs involved, etc., are known to us can we understand the reasons for the opposition.

Is information necessary for environmental managers and for the general public?

Information is crucial for environmental and developmental planning. Any initiative needs to be undertaken only after careful study and analysis. For example, it is now mandatory for any developmental project to have an Environmental Impact Assessment (EIA). The EIA is done to examine all the possible impacts the project will have on the environment. This information is presented to the people through public hearings, etc., so that their opinions about the project can be expressed and suitable action taken.

Unfortunately, very often information may not be available. For example, the possible impacts of introducing a new kind of fish in our lakes may not be known until the fish has been introduced. Sometimes available information may not be complete or authentic. At times it may be biased.

Sometimes, information may be available, but people may not be able to understand it. This often happens when the information is too technical. It becomes important to translate scientific and technical information into terms that people can understand to help them take decisions.



Good Riddance?

Before We Begin

Environmental conservation involves decisions:

Should I carry a cloth shopping bag rather than accept plastic carry bags?

Should we replace all lamps at home with CFLs?

What kinds of trees should we plant?

Should we allow people to collect wood from a protected forest area?

Should we allow a huge dam to be built for generating electricity?

Some of these are individual decisions. Some are community decisions. Some others are policy decisions.

When these decisions are to be made on an individual basis, they may be easy to make. But when decisions have to be made with other people, the process becomes complex. Each person who is part of the decision-making group brings to the group his/her unique skills, knowledge, experience, and opinions.

In an effective decision-making process, the unique strengths of all the team members are pooled in to make a good decision. A good decision takes into account all the facts and information available. It has sound reasoning behind it. An ineffective decision-making process may result in frustration among the group members and/or in a bad decision [one that may be biased, impractical and illogical].

Helping a group to come up with good decisions requires special skills. These include skills to facilitate participation of all members, skills to evaluate the soundness of different options, skills to negotiate, etc.

Environment and development decisions are complex as they involve many dimensions—the environmental dimension, the human dimension, the sustainability dimension, etc. Effective decision-making in this context also requires the skills, knowledge, experience and opinions of a variety of individuals and groups.

Spotlight

Dilemma over DDT

To the Inuit's of northern Canada, it is one of the scariest poisons imaginable: an invisible toxin that has infiltrated the cells of Arctic creatures from plankton to people and turned ordinary whales into floating hazardous waste dumps.

To governments in central Africa it is a chemical safety net, a primary defence against a worsening malaria epidemic that kills 5,000 children each day in countries south of the equator.

We are talking about DDT—an infamous insecticide banned by many countries and still widely used in many others.

Malaria remains a major health problem in more than 90 countries and kills as many as 2.7 million people each year, especially in sub-Saharan Africa. DDT remains the pesticide of choice for many developing countries because it is relatively cheap and is

less acutely toxic than many alternatives. The World Health Organization continues to endorse DDT as a “most valuable tool” for controlling malaria, although it also has begun issuing warnings about the spread of the pesticide through the food chain.

Chemicals like DDT usually enter humans through contaminated foods. Because they are not easily broken down or excreted, the compounds remain in the body for months or years, stored in organs such as the liver, or in fat. In ecosystems they tend to concentrate or ‘bio-accumulate’ in animals at the top of the food chain, in the bodies of large meat-eaters such as marine mammals, polar bears, raptors and people.

At high levels the chemicals are known to damage the central nervous system and suppress the body’s ability to fight off diseases. Many of them are also known endocrine disrupters, which can cause deformities in reproductive organs as well as long-term disruption of reproductive systems.

(Source: “120 Countries to Try to Reach Pact on Phase out of Toxic Compounds”. *Washington Post*, 28.06.98).

Activity - Good Riddance?

Thrust Area	Decision making
Group Size	Up to 60
Time	45 minutes
Materials	Copies of List of people (see below)

Objective

To enable the participants to experience and appreciate a group decision-making process.

Preparation

Make copies of ‘The list of people’ one for each group.

List of people

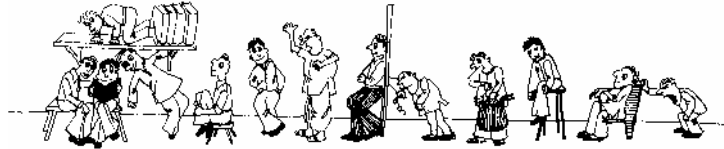
A young man, crazy about new fashions and fads. His latest fad is to be ‘green’. He has now shifted to a strict vegetarian diet and never touches plastic. He is a college dropout and a chain smoker.

A world-renowned social worker. He is nearly 90 years old and suffers from a serious disease, Doctors predict that he will live only for about one year more.

A farmer. He has recently converted his paddy fields into prawn farms. His new business has brought him big money and this power has made him the President of the local environment protection committee. But his neighbours complain that the water in their wells is getting salty and unfit to drink due to seepage from the prawn farms.

A lawyer. He has fought many cases that led to the closure of a number of polluting industries. He is respected by some environmentalists, but hated by trade union leaders who believe his efforts have made many poor workers lose their jobs.

A politician. She has been instrumental in getting many laws on forest protection passed in the Parliament. But the villagers living around the forest areas are angry with the laws as they are now not allowed to gather fuel wood from the forest. There are also some rumours that the politician has taken bribes from a logging company and that now logging goes on in the forest areas under cover.



A cricketer. He is very popular with young students. He has recently started appearing on the TV in a campaign supporting tiger conservation in the country. He also appears in commercial advertisements including one for a huge luxury car.

An industrialist. She was the first industrialist to adopt clean technology and now pollution levels from her factory are down. But the sad part of the story is that the same machines displaced a number of workers from their jobs.

A housewife. She saves water, electricity, and fuel because her household cannot afford to spend more. She dreams of the day when she will be able to spend lavishly like some of her richer friends do.

A journalist. Her reports on controversial environmental issues have brought many environmental issues to public attention. But critics accuse her of presenting only one side of the story.

A scientist. He has a doctorate in biology and heads a natural history museum. His knowledge about wild animals is amazing. But there are rumours that he bribes forests officials and employs poachers to get endangered species of animals for the museum collection.

Procedure

Divide the group into teams of 5-6 players each.

Tell the players that they are an expert team appointed to select people who will represent the country in an international conference to be held nine months from now. The conference is very important as all countries are to make plans for saving the earth from environmental crisis.

Each team has to choose five people to go to the conference, from the list of ten people. The time given for making this decision is 15 minutes.

After this time, ask each team to read out their choices and say why that person has been chosen. The other teams can question the decisions.

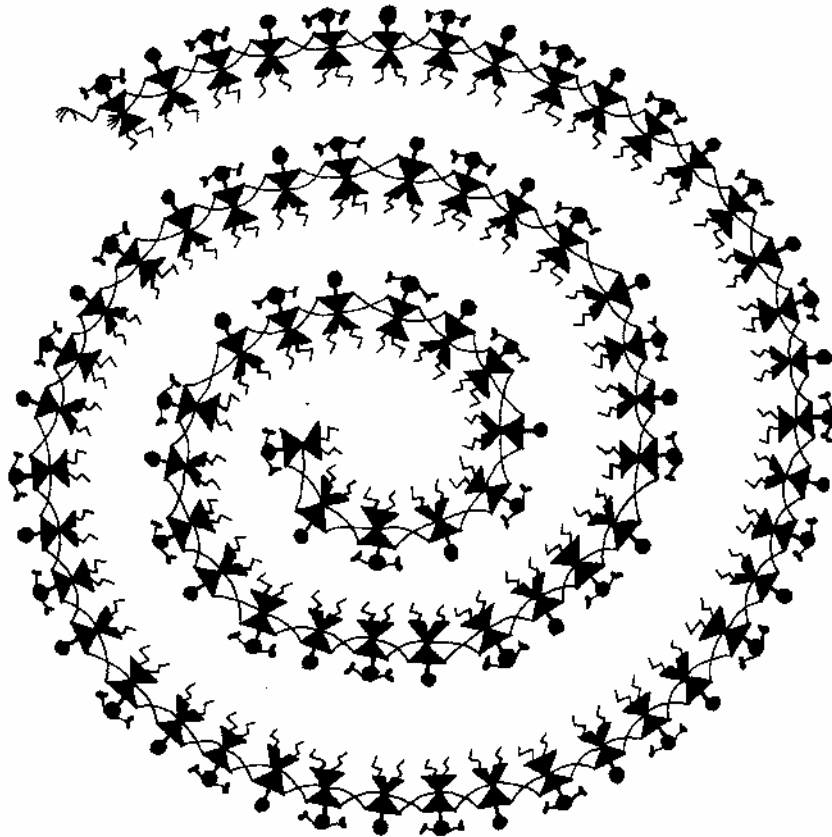
Discussion

Is it easy to make decisions in a group situation? Why?

Making decisions in a group situation may not be easy. There may be conflicting views amongst the members of the group. Ensuring that the opinions of all the members in the group are heard and that all the members negotiate to arrive at a consensus requires special skills.

In the place of people, if there were countries, will it be equally difficult to say which country is environmentally more friendly?

It is difficult to say which of the persons described in the activity is more environment friendly than the others. Each one has certain strengths and weaknesses. Similarly each country has its own environmental strengths and weaknesses. For example, one country may be managing its forests very well, but at the same time its citizens may be consuming products that threaten forests in other countries.



Home Sweet Home

Before We Begin

Human settlements were established originally for economic, social and physical reasons. Historically, the location of human settlements was strongly influenced by the environment. They were sited near sources of water and other natural resources, at crucial

transportation points and in well-protected or easily defensible areas. The presence of commerce and industry is also a significant factor in the location of settlements.

Every human settlement has its own character, reflecting the values and lifestyles of its inhabitants. Its architecture, landscape and economy are also facets of a settlement's character.

Human settlements are a part of the environment. They are also an environment in themselves.

All urban areas need such services as clean water, sanitation and waste collection, and higher-income neighbourhoods should pay the full cost of providing such services.

Construction programmes should emphasize local materials, energy-efficient designs and materials that do not harm health and the environment.

Spotlight

Latur Houses Ignore Safety

“Almost four years after the Latur earthquake, the greatest problem facing the people is that there is no talk of their long-term safety. Despite well meaning efforts of the state government, people have not been trained in quake-resistant technology. As a result, they are still constructing unsafe houses”, according to Rajendra Desai of the NGO Ahmedabad Study Action Group (ASAG).

An earthquake measuring 6.4 on the Richter scale hit Latur and Osmanabad on September 30, 1993. Around 8,000 people died and 16,000 were injured. More than two lakh houses were either destroyed or completely damaged.

Describing conditions in Latur, he said, “Traditionally large houses made of mud and stone have been replaced with crammed concrete rooms. The identical box-like structures have been built in rows which has destroyed the entire village plan.”

Moreover, several concrete houses have already developed cracks during the tremors that followed after the earthquake. “The new houses do not have the comforts or layout of the traditional houses. Villagers cannot afford to maintain them. Also, the new sites are hot and dusty and far away from sources of water and from farms,” Mr Desai said.

Structural engineer and town planner Shirish Patel observed that there was no need to construct new concrete houses. “Traditional materials were not faulty. The flat mud roofs kept the rain out, the stone houses are cool even in the summer and maintenance was easy and affordable,” he noted. “The houses could have been rebuilt on the same location—as the foundations were intact; with the same old materials, using simple quake-proof methods. Around 40,000 craftsmen and masons in the area had used such methods even before the earthquake. Their houses did not fall during the quake,” Mr Patel pointed out.

(Source: “Latur houses ignore safety, say experts”. *Times of India* /Bombay), 25.04.97).

Activity - Home Sweet Home

Thrust Area

Design, Technology and the Environment

Group Size	About 15
Time	45 minutes
Materials	Home Cards (see below), paper and pencils
Objective	To prioritize and make choices regarding environmentally friendly technologies and systems in living spaces.

Preparation

Home Cards

Solar water heater - Free hot water for 8 months a year. No guarantee in the monsoon and winter. Bid starts at 50 points

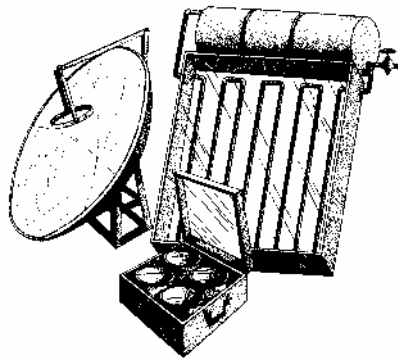
Bus Stop at 5 minutes walking distance - Easy to travel by public transport, saving money and fuel. Bid starts at 20 points

Noise free locality - No noise pollution

Pollution free locality - Clean air

Shopping facility at 5 minutes walking distance - No need to travel huge distances to shop. No need for vehicles which pollute the environment. Bid starts at 20 points

School at 10 minutes walking distance - No need to travel huge distances to go to school. No need for vehicles which pollute the environment. Bid starts at 40 points



Bank at 10 minutes walking distance - No need to travel huge distances to the bank. No need for vehicles which pollute the environment. Bid starts at 40 points.

Provision for solar cooker in balcony - Free cooking fuel for 8 months a year. No guarantee in the monsoon and winter

Solar Street lights - Solar powered street lights in society for 8 months a year. Low maintenance costs and savings on electricity bills. No guarantee in the monsoon and winter

CFLs in the corridors and common spaces - Low electricity bills. Bid starts at 30 points Large windows to let in natural light - Savings on electricity bills White tiles on roof to reflect sunlight - Cooler indoors and savings on electricity Well ventilated rooms - Cooler indoors and savings on electricity

Buildings made of fly-ash bricks - More environmentally friendly alternative to conventional bricks as they are made of waste materials from thermal power plants

Dry waste collection centre - A resident dry waste collector in the society who will collect dry waste and forward them to recycling units. No need for stocking old newspapers, etc., in the house

Compost pit - Manure from kitchen and garden waste. Can be used in the garden or sold to other societies

Water recycling unit - Water from kitchen, bathrooms, etc., will be treated and used for gardening. Bid starts at 70 points

Rain water harvesting structure on roof - Collects rain water for use in gardening, cleaning, etc., saves on ground water. Bid starts at 70 points

24-hour water supply - Assured water supply round the clock. No trouble of storing water in huge quantities in the house. Bid starts at 100 points

Centralized water quality monitoring and treatment system - Guaranteed checking and treating of water to assure that water is always safe and pure. Bid starts at 70 points



Bore well recharging system - No fear of the bore well drying up in the future. Bid starts at 100 points

Individual garden spaces - Garden plots for each apartment, to grow flowers, fruits, vegetables, etc. Bid starts at 30 points

Security - No fear of theft and other crime. Bid starts at 70 points

Community facilities - Community hall, crèche, recreation centre, etc. Bid starts at 50 points

Safety - Safety from fire hazards well protected balconies, etc. Bid starts at 70 points

Solar powered lift - Lift can work on solar power. Guaranteed to work for 8 months an year (the lift will run on electricity for the rest of the year). No guarantee in the monsoon and winter months. Bid starts at 15 points

Recreational facilities (restaurants, cinema halls, etc.) at 15 minutes walking distance - No need to travel long distances for recreation. Save on time, fuel and money. No need to use polluting vehicles. Bid starts at 30 points

Garden at 15 minutes walking distance - Have a refreshing walk whenever you feel like it. Bid starts at 25 points.

Procedure

Divide the participants into two groups of about 5-7 participants each. Tell them the following scenario:

A builder is planning to set up two housing societies. People who have booked their apartments in the two housing societies have approached the builder for certain special services and facilities. The builder has only one of each of these facilities and services to offer the two housing societies and will give each facility/service to the housing society who will pay the most. The builder has called for a meeting of representatives of both the housing societies, to auction off each facility and service.

Tell the participants that you [the facilitator] will represent the builder. You will auction each service/facility to the society which makes the highest bid.

Ask each group to select one volunteer. Read out the list of services/facilities you have, and ask the volunteer of each group to take down the list on paper. Do not read out the starting prices of the service/facilities. For example,

SAY:

Safety - Safe from fire hazards, well protected balconies, etc.

DO NOT SAY:

Safety - Safe from fire hazards, well protected balconies, etc. Bid starts at 70 points.

Ask each group to look at the list of services/facilities available for sale, discuss and decide on the ones they would like to have in their society. Tell them that each group has 500 points to make their purchases.

Give the groups 10 minutes for this task.

After this time, announce that the auction is about to begin.

You will auction one eco-friendly service/facility at a time. Take one service/facility card at a time, read out all the information on the card—the caption, the information and the starting price (if any).

Each group will have to make bids for buying the service/facility. They can bid only in multiples of five. For example, the following bids are valid—5, 10, 15, 20, 25, 30, 35, 40, etc. The following bids are not valid—12, 2.5, 37, 98, 106, 74, etc.

After the first group makes its bid, the second group can bid at a higher price. The first group can then bid higher than the price the second group has quoted. This goes on till one group decides not to bid any more, and withdraws. The service/facility is then given to the group which has made the highest bid.

Proceed in this fashion for each of the service/facility cards.

After all the services/facilities have been sold, ask both the groups to review the purchases they have made.

Now, ask each group to make a presentation on their housing society. They have to give an account of the services/facilities in their society, read out the list of services/facilities they would have liked to have but do not have, and explain why they would have liked to have those services/facilities. Give the groups 10 minutes to prepare for this presentation.

Discussion

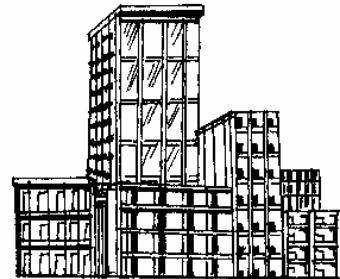
What facilities and services contribute to making an ideal living space?

A number of factors contribute to making an ideal living space. These will include physical factors such as space, light, construction materials; availability of and access to services such as water supply, energy, sanitation; social factors such as proximity to places of commerce, education, entertainment, opportunities for social interaction; environmental factors such as greenery, freedom from pollution, etc.

Do we always pay for all the services/facilities we use?

We consume a number of services and facilities—public transport, water supply, electricity supply, garbage disposal, etc. We may seem to pay for some of these. For example, we pay for the electricity we use. But very often what we pay does not meet the real cost of providing us a particular service or facility. The real cost is subsidized. For example, the electricity we use may be hydro-electricity generated by a dam. The construction of the dam may have displaced people and submerged agricultural lands and forests lands. This cost behind the production of electricity is not reflected in the bills we pay. If it was, electricity would be a much more expensive facility and people would probably be more judicious in its use.

We need to realize that a cheaper bill does not mean that there is no ‘cost’ behind making these services and facilities available. There is a cost, but somebody else is paying it. In the example of the dam, it is the people displaced because of the dam.



Care and Share

Before We Begin

A partnership of the world's nations is essential to achieve Sustainable Development.

A major international initiative in the progress towards Sustainable Development was the United Nations Conference on Environment and Development organized at Rio de Janeiro in 1992. The Rio Summit was an unprecedented event. It brought together more heads of government than any meeting in history. It helped to focus world attention on environment and development issues. This conference produced five documents of international importance. They are:

- *Rio Declaration on Environment and Development*. The principles in this document are meant to guide future development. They define the rights of people to development, and their responsibilities to safeguard the common environment.
- *Agenda 21*. This is a blueprint on how to make development socially, economically and environmentally Sustainable.
- *Statement of Principles on Forests*. The principles guide the management, conservation and Sustainable Development of all types of forests, which are essential to economic development and the maintenance of all forms of life.
- *United Nations Framework Convention on Climate Change*. This seeks to stabilize greenhouse gases in the atmosphere at levels that will not dangerously upset the global climate.
- *Convention on Biological Diversity*. This requires the countries to adopt ways and means to conserve the variety of living species, and ensure that the benefits from using biological diversity are equitably shared.

Spotlight

Punjab farmers to tame the unforgiving Kalahari

Large tracts of the unforgiving Kalahari Desert in Namibia will soon be converted into lush fields of sunflower, wheat, groundnut, cotton, fruits, vegetables and *her*. And, the farmers who will make this possible will come from Punjab and Rajasthan.

“We will not only get technocrats and agriculture experts but also actual farmers from Punjab who will come and live here for the duration of the project to cultivate the land and teach Namibian farmers,” a senior Indian official in Namibia said. One of the mega projects being discussed between India and Namibia during Prime Minister Atal Behari Vajpayee’s visit to the country is in the field of agriculture where the Indian farming community and experts will help convert large tracts of dry, arid land in the Kalahari desert into crop-producing fields.

An agreement for cooperation in the field of agriculture, research and training was signed between the two countries on Monday. As part of the agreement, the ministries of agriculture of the two countries will help “promote the progress of research and training in scientific cultivation and improvement of production techniques”.

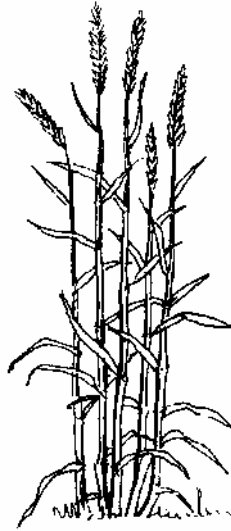
The agreement follows Namibian President Sam Nujoma’s visit to the Central Arid Zone Research Institute in Jodhpur in February 1997.

“During his visit, the President was very impressed by how Indian farmers have converted dry, arid desert land into crop-producing land, particularly by ^{/^/}plantations. It was then that the idea was mooted and subsequently it has now taken shape in a project,” Indian officials said.

One of the first projects under this agreement will be a joint venture between the Namibian Development Corporation and Punjab Agro, a state government agency.

After the modalities of the agreement are worked out, Indian agriculture experts and farmers from Punjab will come to Namibia and begin work.

[Source: Kumar, P. “Punjab farmers to tame the unforgiving Kalahari”. *Asian Age* (New Delhi), 01.09.98).



Activity - Care and Share

Thrust Area	Cooperation for Sustainable Development
Group Size	Up to 60
Time	15 minutes
Materials	None

Objective

To help participants realize the importance of sharing and working together for achieving a common goal.

Procedure

Divide the group into teams of about 10-15 players each. There is no limit to the number of teams, but the teams should have equal numbers of players (as far as possible).

The players should not carry any object other than what they already have on themselves, e.g : they are not allowed to carry books, but they are allowed to keep on their watches, ribbons and other things they have on them.

After the players are ready, tell them that each team represents a country.

The task for each team is to make a line'. The line represents their progress on the path to Sustainable Development. They cannot draw a line in the real sense, but they are to make a line using the objects they have with them. The time given for making the line is 60 seconds.

The team which has the longest line wins.

Discussion

Can the environmental crisis be resolved through cooperation within and amongst nations?

Just as all individuals can contribute to conserving the environment, all nations also have a role to play. The roles may be different depending on the country (just as the contributions that made up the line are different). For example, a developed country may have to concentrate on reducing the highly consumptive life styles of its people. It may have to help its citizens' adopt more environmentally friendly goods and technology, whereas another country may have to concentrate on reducing the growth of its population and on decreasing poverty.

What is the significance of individual contributions in a common cause?

Environmental problems—pollution, deforestation, green house effect, ozone hole—all seem large and complex. But the solutions for these problems are not all big and complex. Even small actions can contribute to solving the problems. Small actions alone will not solve the problems...but they will help. Every individual has a role in contributing to environmental conservation and Sustainable Development. Actions that individuals take in different capacities at different levels can help in progress towards Sustainable Development.



End